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OF

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AGRICULTURE, SHIKAR & TRAVEL.

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X

THE

INDIAN FORESTER.

Vol. XI.] October, 1885. [No. 10.

REMARKS ON THE ADMINISTRATIVE FOREST STAFF OF PRUSSIA AND THE TRAINING OF ITS OFFICERS.

MAJOR Bailey lately suggested to me that I should put together, for the readers of the *Indian Forester*, a few remarks regarding the training of candidates for the administrative forest service in Prussia and other German States. I have endeavoured to do so in the following pages, and hope that the data, which I have collected, may interest some of those with whom I have had the pleasure of being associated during my Indian service.

The total area of the State forests in the kingdom of Prussia is 2,670,228 hectares (6,597,000 acres), and the ordinary annual yield of this area in timber and small wood, amounts to 7,608,617 cubic metres (5,374,000 loads of 50 cubic feet). The financial results, as estimated for 1884–85, in pounds sterling, stand as follows :—

	£	£
Receipts, ...		2,616,600
Current ordinary charges, ...	1,530,000	
Capital outlay and extraordinary charges, ...	122,000	1,652,000
Surplus, ...	...	964,600

Thus the gross revenue from one hectare amounts to 19·6, and the net revenue to 7·2 shillings. The area here stated is total area as it stood on 1st April, 1884, and includes 112,340 hectares of roads, lakes and ground which cannot be utilized.

The money return of the Prussian State forests is smaller

than in some other States of Europe. Thus, for the State forests of France, not including Algeria, the *Annuaire des Eaux et Forêts* for 1885 furnishes the following data :—

Total area (December 1884),		hectares	1,012,688
Gross revenue,	...	... £	1,403,400
Charges, ...	...	... „	579,040
	Surplus,	... „	824,360

In the State forests of France, therefore, the gross revenue amounts to 27·7, and the net revenue to 16 shillings per hectare. The chief reason for the difference is the more favorable climate of France, which makes it possible mainly to rely upon natural reproduction, the soil which, as a rule, is more varied and more productive, and lastly, the fact that France has few deposits of coal, and that while in Prussia 25 per cent. of the total area is covered with forest, France has only about 16* per cent.

The subordinate staff of the Prussian State forests, which is chiefly employed for their protection, and which corresponds to Foresters and Forest Guards in India, numbers 3,783 persons.

The administrative staff is constituted as follows :—

I.	Direction (at Berlin): 1 Oberland forstmeister, 3 Land forstmeister, 1 Ober forstmeister, 2 Forstmeister, 1 Oberförster, ...	8	officers.
II.	Inspection : 30 Ober forstmeister and 92 Forstmeister, ...	122	„
III.	Executive: 677 Oberförster, in charge of forest districts or ranges, ...	677	„
	Total, ...	807	„

If we compare this organization with that existing in India, it may be said, that while the Oberland forstmeister corresponds to the Inspector General of Forests, the class of Oberförster corresponds to Forest Rangers and executive officers of superior rank, say Sub-Assistant Conservators and junior Assistant Conservators. The duties of Conservators and Divisional officers are performed in Prussia by the officers of the class of Ober forstmeister and Forstmeister.

Besides the management of the State forests, this staff has also the general control of more than three million acres of other public forests, *viz.* :—

* Total area of France in 1872—52,905,000 hectares, and area of forests (*Bois et Forêts*)—8,397,131 hectares, according to page 61 of the *Annuaire* for 1885.

977,084	hectares,	belonging	to towns and villages.
88,445	"	"	to public institutions, such as schools and hospitals.
237,005	"	"	to public associations (*Genossenschaften*).
1,302,534	"	or 3,220,000 acres.*	

The total area of private forests in the kingdom of Prussia is estimated at 4,473,933 hectares, or nearly 11 million acres. Save in exceptional cases, which are regulated by law, in which the public welfare demands interference, the management of the private forests is entirely free and unfettered.

Training of Administrative Forest Officers.

About 28 permanent vacancies a year arise in the Administrative Forest Staff, which as shown above, comprises 807 appointments. It may interest Indian Forest officers to learn, in what manner these vacancies are filled up. The course of practical and theoretical instruction to be gone through by candidates for the superior forest service in Prussia, as well as the examinations which they have to pass, has lately formed the subject of Government orders, which were published on the 1st August, 1884. The first step is to obtain permission to go through a practical apprenticeship of one year in one of the State forest districts. The papers which the candidate has to submit, in order to obtain this permission, include a medical certificate and the certificate of having passed the closing examination at one of the large German public schools (Gymnasium), which must be passed by all who desire to enter the higher branches of the State service in any of the great public departments.

For those who desire to enter the State Forest Service, a special condition is attached, that they must have passed with credit in mathematics. During the practical apprenticeship the candidate is expected to make himself familiar with the forest district and the working of it. He is employed in timber works, in planting and sowing and other cultural operations, he assists the executive and protective officers in their work, out-of-doors as well as in the office, he is taught the use of instruments, and takes part in surveying, levelling and road-making whenever an opportunity offers. There is much hunting and shooting, and the result is that he becomes well acquainted with the forest district in which he has passed his apprenticeship.

* These, as most other figures of the present paper, are taken from *Judeich und Behm, Forst und Jagd Kalender*, 1885. Some are taken from the work: *Die Forstlichen Verhaltnisse Preussens*, first edition (1867), by Otto von Hagen, second edition (1883) by K Donner, the present head of the Prussian Forest Service (Oberland forstmeister)

In the case of satisfactory progress, the officer in charge of the district (Oberförster) grants a certificate, which is countersigned by the inspecting officer (Forstmeister). After obtaining this certificate, the candidate has to attend during two years the regular course of lectures and practical exercises at one of the German Forest Schools.

Forest Schools in Germany.

In the German Empire there are at present eight superior Forest Schools :—

1. Prussia, Neustadt Eberswalde, Director, Ober forstmeister Danckelmann, Doctor of Law.
2. Prussia, Münden, Director, Ober forstmeister Dr. Borggreve.
3. Bavaria, Aschaffenburg, Director, Forstmeister Fürth, and the Forest College of the Münich University.
4. Saxony, Tharand, Director, Geheimer Oberforstrath Dr. Judeich.
5. Würtemburg, Tübingen, forming part of the University.
6. Baden, Karlsruhe, forming part of the Civil Engineering College.
7. Hesse Darmstadt, Giessen, forming part of the University.
8. Grand Duchy of Saxony, Eisenach, Director, Oberland forstmeister Dr. Grebe.

Of these Forest Schools Tharand is the oldest, having been founded in 1811 as a private institution by H. Cotta. It was taken over by the State in 1816. At present the course extends over two years-and-a-half. The Director, Geheimer Oberforstrath Dr. Judeich, lectures on history and literature of forestry, utilization of forest produce, principles and drawing up of working plans, and control of forests, not the property of the State. The forest district of Tharand (1,020 hectares) is attached to the School, and is, as regards technical matters, under the Director's control. The officer in charge, Professor Neumeister, teaches sylviculture, protection, administration, the art of shooting and hunting. He as well as the Director conduct excursions and practical exercises. There is one Professor for applied mathematics, surveying, levelling and road-making, another for pure mathematics, mechanics and physics. Jurisprudence is taught by the Judge of Tharand ; there is one Professor for political economy and the theory of agriculture, and there are four Professors for mineralogy and geology, chemistry, botany and zoology.

Eisenach and Neustadt Eberswalde were both founded in 1830. At Eisenach the Director of the Forest School, Oberland forstmeister Dr. Grebe, has charge also of the working plans branch for the forests of the Grand Duchy of Saxe-Weimar, and he has the control in technical matters of the forest districts

in the vicinity of Eisenach, aggregating 8,700 hectares. Dr. Grebe teaches forestry, and there is one Professor for pure and applied mathematics and two for natural sciences.

Of late years the question has been much discussed, whether Forest Schools should not be attached to Universities. At Giessen, in Hesse Darmstadt, this arrangement has existed since 1831, and there are two Professors of Forestry, the other branches being taught by Professors of the University. A similar arrangement exists in Würtemberg. The Forest School, which for a time was combined with the Agricultural College at Hohenheim near Stuttgart, was in 1881 re-transferred to Tübingen, where there are now two Professors of Forestry, Forstrath Dr. von Noerdlinger and Professor Dr. Lorey.

At Karlsruhe (Grand Duchy of Baden) the Forest School is attached to the Civil Engineering College, there being two Professors of Forestry, and the other branches being taught by the other Professors of the College.

In Bavaria, the plan of transferring the Forest School of Aschaffenburg to the University of Münich was formed some years ago, but owing to opposition of the ultramontane party in the Chamber of Deputies, it was only partially carried out. Hence the Forest School at Aschaffenburg has been maintained, and in addition Professors have been appointed at Münich for the different branches of forestry and connected sciences. At the time of his death, Gustav Heyer was at Münich, and some men of great distinction are now teaching forestry at that University. Professor Ebermayer, the author of the well-known work on the climatic influence of forests, teaches chemistry and meteorology, Professor Gayer sylviculture and utilization of forest produce, while Professor R. Hartig teaches botany, including diseases of trees, which has formed the special subject of his researches.

The two Prussian Forest Schools have been maintained as distinct institutions, but both are situated in the vicinity of Universities, Neustadt Eberswalde near Berlin, and Münden near Göttingen, and in the case of Münden several of the Professors at Göttingen teach at the Forest School. Both Eberswalde and Münden are situated in the midst of large and instructive State forests, and several forest districts are attached to each of these institutions for purposes of instruction. For these districts the Director of the Forest School is in the position of inspecting officer, he controls their management in regard to all technical matters, and most of the officers in charge of these districts are employed in teaching at the Forest School. The forest districts attached to Eberswalde are Chorin, Eberswalde, Biesenthal and Freienwalde, aggregating 18,665 hectares, or about 46,500 acres, and Forstmeister Bando of Chorin, Forstmeister Runnebaum of Eberswalde, Oberförster Zeising of Biesenthal and two junior Forest officers (Forst Assessor) teach history

of forest management, statistics, general forest economy (forst-politik), protection of forests, forest technology and utilisation of forest produce, hunting and shooting, forest administration, valuation of forests, surveying, levelling, the use of the instruments and road-making. The Director himself teaches sylviculture, the systems of working plans, and commutation of rights of user. Excursions into the forests attached to the School are conducted by the Director and the Professors. Considerable time is devoted to practical exercises in surveying and levelling.

As regards the auxiliary sciences, there is Professor Remelé for chemistry, mineralogy, geology and classification of soils, Luerssen for botany, Altum for zoology, Müttrich for mathematics, mensuration of solid bodies, physics, mechanics and meteorology, while forest jurisprudence is taught by the Judge of Neustadt, Amtsgerichtsrath Rätzell. Several of these Professors have Assistants for their lectures and the work in the laboratory. Attached to the school are a library, laboratory, a museum of natural history and forest products, an institution for pisciculture, and several forest gardens; botanical, zoological and geological excursions are conducted by the Professors.

Connected with the Forest School is the institution for experimental forestry of Prussia, which is under the direction of Dr. Danckelmann. At 12 stations in the different provinces meteorological observations are made, and sylvicultural experiments are conducted under the control of the Director. Similar institutions, but on a smaller scale, exist in all German States, there is a permanent association, and periodical meetings of the Directors and others interested in these experiments are held, when the questions to be solved are discussed, and a programme of proceedings is from time to time agreed upon.

The Director of the Forest School at Münden is Oberforstmeister Dr. Borggreve, and he has the control in technical matters of Gahrenberg and Cattenbühl, aggregating 7,500 hectares, or about 18,700 acres. The different branches of forestry are taught by the Director, the two officers in charge of the forest districts attached to the school, and the officer in charge of a third forest district in the vicinity who resides at Münden. The subjects are divided as follows:—The Director teaches general forest economy (forst-politik), sylviculture, the systems of working plans, valuation of forests, forest literature, the art of hunting and shooting. Forstmeister Knorr takes utilization of forest produce, protection, forest administration and history of forestry. Oberförster Kalk takes mensuration of timber, sub-division of forests and road-making. Oberförster Dr. Kienitz lectures on the peculiarities of (German) forest trees from a Forester's point of view, and assists the other Professors of Forestry. Excursions are conducted by the Director and these three Forest officers. For the auxiliary sciences the

arrangements are similar to those at Neustadt Eberswalde. Political economy, finance and jurisprudence are taught by two Professors of the Göttingen University.

The two Forest Schools in Prussia, as well as those in the other States of Germany, are maintained at the expense of the State. The fees paid by students are insignificant, and amount to about £8 a-year. Candidates for the Prussian Forest Service may study at any of the German Forest Schools outside Prussia, but they must obtain authority for so doing.

After completing their studies at the Forest School, they attend lectures on jurisprudence and political economy (*Rechts-und staats-wissenschaften*) during two terms at a University. This occupies another year. Allowance must also be made for their year of military service, so that altogether five years are spent before they are permitted to present themselves for the first examination.

Examinations.

Candidates must not present themselves later than six years after the commencement of their apprenticeship. Besides the papers regarding practical apprenticeship, their studies at the Forest School and University, they must submit large scale plans with the field-books of a plot which they have surveyed, measuring at least 100 hectares (247 acres), as well as of a line not less than 2 kilometres (1·24 mile) long which they have levelled. Also a forest map, which they have drawn, of an area at least 500 hectares (1,235 acres) in extent.

The examination, like all others for State service in Prussia and other German States, is a pass, and not a competitive examination. A high standard is fixed, which must be attained. The subjects required are—all branches of forestry, surveying, pure mathematics, statics and mechanics, selected branches of jurisprudence, botany, zoology, mineralogy, physics and chemistry. On passing this examination the candidate receives the designation of "Forst-referendar." If he has not attained the requisite standard, he is permitted to present himself once more, but once only.

The next step is to spend two years in practical work in several forest districts. During this period, which is styled *the Biennium*, the Forst-referendar must serve at least six months, between December and May, in the position of a Forester in charge of a beat or sub-division of the forest district. During this time he must carry on the current work of the beat, as regards protection, the cutting, measurement, classification and sale of timber, as well as regards all cultural operations. During another period of five months, he acts in charge of an entire forest district, under the general control of the Oberförster, who remains responsible, and countersigns all orders issued, as

well as reports and accounts rendered by the Forst-referendar while in this position.

At least four months must be devoted to valuation surveys and other work connected with the preparation of working plans. During this time he is attached to a party of the working plan branch, and is charged with the work of junior officers attached to that party, without however receiving any remuneration.

The remaining period of the Biennium must be spent in instructive forest districts, where the Forst-referendar is expected to use every opportunity to become familiar with the treatment of different descriptions of forest and the system of forest administration as conducted in different provinces and under different circumstances.

After completing the Biennium, the Forst-referendar presents himself for the second examination. In addition to the papers relating to his studies and the first examination, he is bound to submit the diary which he is required to keep during the Biennium.

The chief object of the second examination, which like the first is held partly out-of-doors in the forest, is to test the fitness of the candidate for the management of forests and for forest administration generally. The subjects required include all branches of forestry, but the questions asked have more special reference to the actual requirements of the service, than was the case in the first examination. Special attention is also paid to civil and criminal law and procedure, as well as to political economy.

Prospects of passed Candidates.

Those who have successfully passed the second examination, receive the title of Forst Assessor, and are eligible for appointments in the State Forest Service. As far as practicable, they are employed as Assistants (Hülfsarbeiter) in the working plans branch and in the forest branch of the Local Governments of Provinces, as instructors of the candidates for subordinate forest service who are serving their three years in the battalion of riflemen (Jäger) which is attached to each Army Corps, or otherwise on special duty. While thus employed, they generally receive daily allowances. Government, however, is in no way obliged to find permanent employment for passed candidates, and many, who do not find such employment, obtain appointments in forests belonging to towns and villages, to public corporations or private proprietors. On the 15th October, 1884, there were 147 officers holding the rank of Forst Assessor in Prussia, who had not obtained permanent appointments in the State Forests, and of these 29 had passed their second examination in 1882, 20 in 1881, 24 in 1879, and 9 in 1878.

In addition to these there were 83 military officers, belonging to the Corps of *Reitende Feldjäger*, who had passed the same

examinations, and who are equally eligible for appointments in the administrative staff of the forest service. The Corps of Reitende Feldjäger was established in 1740, with the view of forming a Corps of Guides for the army in the field. Most of its members look for permanent employment in the administrative forest service, and are meanwhile eligible for temporary employment in the same manner as civilian Forst Assessors. Those who desire to enter this Corps, must serve their year with the Riflemen, and must pass a special examination afterwards. Service as Feldjäger has certain advantages, and admission is not readily obtained. In time of war they carry despatches or are otherwise employed, and some members of this Corps are always on duty as Foreign office messengers to carry despatches between Berlin, London, Paris, Constantinople, and other capitals.

Before 1866, when Prussia attained its present extent through the annexation of Hanover, Schleswig-Holstein and other provinces, the annual vacancies on a total of 436 administrative forest officers amounted on an average to 16. In the 31 years, from 1835 to 1865, there occurred 504 vacancies, whereas during the same period the number of those who passed the final examination was 575.* Since then the number of appointments has increased largely, but the number of those who prepare themselves for this branch of the public service, has also increased, and many have to find employment elsewhere. Between 1860 and 1881 the mean age of those who obtained appointments as Oberförster was between 32 and 35 years. Further promotion to the grade of Forstmeister and upwards is entirely by merit, and a large proportion never advance beyond the grade of Oberförster.

Organization of Forest Administration.

The average area of a State forest district is 3,900 hectares, or 9,600 acres. But the area varies much in the different parts of the country. The extent of an Oberförster's charge is largest in the eastern provinces near the Russian frontier, where the demand for timber and other forest produce is less than in the central and western districts. In those provinces some forest districts contain more than 10,000 hectares, or 24,700 acres.

Each forest district is sub-divided into a number of beats, (*Schutz-bezirke*) under subordinate officers, whose chief duty is the protection of the forest, but who are also entrusted with a share in the executive management, subordinate to the Ober-

* These figures are taken from p. 222 of the excellent work, *Die Forstlichen Verhältnisse Preussens*, by Otto von Hagen, the late Chief of the Prussian Forest Department. (First edition, 1867).

förster, whenever circumstances render such advisable. There are on an average from five to six sub-divisions in each forest district.

Each of the 13 provinces of the kingdom is divided into a number of divisions *(Regierungs-bezirke)* with a Local Government, at the head of which is the "Regierungs Präsident." The province of Rhenish Prussia, for instance, consists of five divisions—Coblenz, Düsseldorf, Cöla, Trier, Aachen. In each of these divisions, as throughout Prussia, the chief Forest officer (Ober forstmeister) is a member of the Local Government, and the forests of each division are divided into a number of inspection circles (Forst inspection). Thus there are four such circles in the Regierungs-bezirke of Coblenz, one in charge of the Ober forstmeister, the others in charge of officers having the designation of Forstmeister. In each circle are included, besides the State forests, all other public forests which are situated within its limits. As stated in the beginning of this paper, the number of these inspecting officers, including the two Directors of the Forest School, is 122, and these appointments are filled by selection of the most skilful and capable among the officers holding the appointment of Oberförster. The same principle is followed in filling up the highest appointments.

To recapitulate, the Oberförster, aided by the subordinate officers, manages the forest district in his charge, and a number of forest districts are under one inspecting officer, who is directly subordinate to the Local Government of the Division (Regierungs-bezirke). The control of forest business in the kingdom is vested in the Secretary of State (Minister) of Agriculture, State Domains and Forests, and the Oberland forstmeister is Director of the forest branch of that Ministry. The work entrusted to the officers of the forest branch consists in tours of inspection; chiefly for the settlement of special questions, and in dealing with the forest business, which is sent up to the Ministry for decision by Local Governments. Subordinate to the forest branch of the Ministry are the office for forest surveys and working plans, and the Forest Schools of Eberswalde and Münden.

In order to complete the account of the work done by the Administrative Forest Staff of Prussia, it will be necessary to say a few words regarding the management of the communal and other public forests which are under the control of the Government. The extent to which this control is exercised, is regulated by law, and the law in this respect is different in different portions of the kingdom. In certain provinces, *viz.*, in the former kingdom of Hanover, the former Electorate of Hesse Kassel and the former Duchy of Nassau, most of the communal forests are managed by the State Forest officers, and are generally included in forest districts with the neighbouring State forests. Towns, villages and proprietors of these forests contribute certain rates

on the acreage of their forests to the expenses of administration. In the other provinces the control of Government is generally limited to the maintenance of the forest area, and their working according to conservancy principles. In Westphalia and Rhenish Prussia, the communal forests have been formed into administrative charges under a distinct class of officers (Gemeinde Oberförster), who go through a course of training similar to that of State Forest officers, but shorter, and who pass examinations, the standard of which is somewhat lower than that fixed for the administrative State forest service.

The control over the communal and other public forests is exercised by Local Governments, and matters which require reference to higher authority are dealt with both in the Ministry of Agriculture and State Domains and in the Ministry of the Interior. To the Ministry of Public Instruction are subordinate certain forests, which are the property of Colleges and similar institutions.

Pay and Allowances of administrative Forest Officers.

A few words may now be added regarding pay and allowances of the administrative forest staff in Prussia. The pay of the Oberförster ranges from 1,800 to 3,300 marks a-year (£90 to £165). In addition to this he draws a consolidated allowance, up to 2,100 marks (£105) a year, to cover the keep of horses and incidental expenses connected with the maintenance of his office. He is entitled to a free house, or compensation where there is no official residence, as well as to free fuel. Generally he is allowed free pasture for his cattle in the forest and a small farm, usually from 50 to 60 acres in extent, on his paying a nominal rent. On transfer from one appointment to another, an Oberförster receives £15 to cover the expenses of the move, in addition to a mileage rate of 8*s*. for 10 kilometres (6·2 miles) for the distance between the two posts.

Pay and allowances of the superior officers are higher in proportion. The Forstmeister (junior inspecting officer) draws from £180 to £300; an allowance for house rent, and up to £145 a-year as a consolidated travelling allowance, with additional daily or mileage rates for official journeys beyond the limits of his charge. The pay of the Ober forstmeister (chief inspecting officer of a division) (Regierungs-bezirke) is from £210 to £300, with allowances in proportion.

The pay of State Forest officers is small in Prussia, smaller than in some of the minor states of the German Empire, but the additional allowances are high in proportion, and distinguished service is promptly rewarded by titles, decorations and public recognition, by promotion, and in some cases by the grant of special rewards. Forest service is exceedingly popular among the best classes of society. Though here and there matters may not be perfect, there is no discontent, and it would be difficult

to find a body of officers more enthusiastically devoted to their profession and more efficiently prepared for its duties, than the administrative State Forest officers of Prussia.

In common with all superior State officers in Prussia, they receive suitable pensions after retirement, and their widows and orphans are well cared for. Invalid pensions are granted to forest officers at the rate of one-fourth of pay and those allowances which count for pension, after the close of 10 years' service, of three-fourths after 40 years' service, and at intermediate rates between 10 and 40 years' service. An officer may claim his pension, without any medical certificate, after having attained the age of 65 years.

In Prussia all State officers are required to contribute 3 per cent. of their pay and pensionable allowances to the General Widows and Orphans Fund. In return the State pays to each widow a pension, amounting to one-third of the pension which would have been due to her husband on the day of his death. Up to 18 years of age each orphan (whose mother is dead) receives one-third, and each child with the mother one-fifth of a widow's pension. The aggregate amount of widows and orphans pensions must not exceed the pension to which the deceased officer would have been entitled on the day of his death. In addition to this, the family of the officer receive his full pay during three months following the month in which he died.

Training of administrative Forest Officers in Bavaria.

In the other countries of the German Empire, the organization of forest business and the training prescribed for State Forest officers is similar to that in Prussia. A few remarks regarding the course of training in Bavaria, the kingdom next to Prussia in extent and importance, may not be out of place.

As in Prussia, candidates must have passed the closing examination of a public school (Gymnasium). There is no preparatory apprenticeship in a forest district, and they at once commence by attending the Forest School at Aschaffenburg during a period of two years. I may here mention that, in Saxony, candidates before commencing their studies at Tharand, are required to pass through a practical apprenticeship of six months.

At Aschaffenburg, mathematics and natural sciences are taught by five Professors, sylviculture, protection of forests, the art of shooting and hunting are taught by the Director, Forstmeister Fürst, assisted by the Oberförster in charge of the forest district (Klein Ostheim) which is attached to the school. After completing the course at Aschaffenburg, two years' study at a University is prescribed, of which one year must be spent at Münich. At this University has been established the insti-

tution for experimental forestry of Bavaria. It is under the control of the senior Professor of Forestry, and candidates for the administrative forest service of Bavaria must, while studying at the University, attend during one year the practical exercises at that institution.

After completing their studies, candidates present themselves for the first examination, and those who pass have to spend two years in practical work in selected forest districts. For this purpose the Government appoints from time to time instruction forest districts in the different provinces, which are in charge of officers specially qualified to undertake the practical training of candidates. During a third year candidates are employed on special works, or they are attached to the forest branch of a provincial Government, and during this period they usually receive daily allowances.

Having passed the first examination, completed the three years preparatory service, and having gone through his one year's military service, the candidate may present himself for the final examination, and when this has been passed, he becomes eligible for an appointment in the administrative staff. At present a great re-organization of the administrative forest staff in Bavaria is on the point of being carried out, but to enter into this subject would lead too far on the present occasion.

As explained, an additional year of studies is substituted in Bavaria for the preliminary apprenticeship, which is required in Prussia. On the other hand there is in Bavaria an additional year of preparatory practical service, but for the work done during this year, candidates generally receive some allowances. Thus in Prussia three years' practical work and three years' study are required from candidates, while in Bavaria four years' of study and three years' practical service must be completed, before candidates are admitted to the final examination.

Conclusion.

Candidates for the higher branch of the Indian Forest Service have hitherto been admitted on the ground of an entrance examination, at which in mathematics, natural science and modern languages, the standard has been about on a level with that of the closing examination at a Gymnasium in Germany, while Latin, Greek, history and geography were not included among the subjects of the examination. Two years-and-a-half were then allotted to the study of forestry, the auxiliary sciences and practical work in the forests. It is obvious that in so short a period the preparation for practical service could not be as efficient as in Germany, where from six to seven years are devoted to it. In France matters are somewhat different, partly because the French students who enter the Forest School at Nancy have previously attained a much higher standard in mathematics and natural sciences, than is required at the closing exami-

nation at a Gymnasium in Germany. Their subsequent professional preparation extends over three years.

When in 1866 I was permitted to organize a system of professional training in the State forests of France and Germany of young Englishmen specially selected for this purpose, I was well aware that two years-and-a-half would be too short a period to attain really satisfactory results. It was not, however, considered possible to assign a longer time to these studies.

My experience in India and in England has convinced me, that young Englishmen of the educated classes are by constitution and habits admirably fitted to make first-rate forest officers, and it must to a great extent be ascribed to the natural aptitude of young Englishmen for forest work, that such satisfactory progress has been made in the organization and management of the Indian State Forests, by officers, most of whom had not gone through a professional training sufficient to prepare them fully for the work to be done.

Hitherto forest work in India has been more of an administrative than of a professional character. As further progress is made, this will change, and new problems in cultural operations, the treatment of forests to secure natural reproduction, in regard to protection against insects and other enemies, and the elaboration of working plans will present themselves, which will tax the forester's skill to the utmost. I do not maintain, that what the Indian Forest officer has learnt of chemisty, botany and zoology and of forestry in Europe will directly help him, but the man who has entered into the spirit of scientific research, and who has become familiar with the results of methodical forest management in those countries, where forestry is best understood, will have a better chance of arriving at correct conclusions, and devising practically useful methods, than the man whose instruction in these matters has been imperfect.

In 1866 one main difficulty was, that sufficient facilities for acquiring the necessary knowledge in applied mathematics and natural sciences did not exist everywhere in Great Britain, and that it was therefore not feasible at that time to require at the entrance examination the same standard in applied mathematics and the natural sciences, which forest students are required to attain, before being admitted to the Nancy Forest School. Within the last 20 years this has completely changed. The instruction in science in Great Britain has now become so much developed, and so many more institutions for teaching science have been established, that, provided the subjects required are clearly defined, it would not be unreasonable to expect students to master the auxiliary sciences before admission to the professional training, and it would not be difficult to test proficiency in these branches of science by means of practically arranged examinations.

At the present time one of the difficulties in the way of a

satisfactory arrangement of this most important business may possibly be, that the number of those who have presented themselves at the annual entrance examinations, has lately not shown a tendency to increase, but rather the reverse. This may be due to the uncertainty regarding the new system which will be adopted in regard to the professional training of candidates. Or it may be due to the prospects of forest service in India in regard to pay and pension not being considered sufficiently attractive.

Had candidates of late years come forward in larger numbers at the annual entrance examination, it would not be difficult to raise the standard, and if their proficiency in natural sciences were tested, as is now commonly done in England for other purposes, by means of work done in the laboratory, a firm basis could be gained, whereupon to build a good system of training in forestry. But whether this plan is followed, or whether Government undertakes the teaching of the auxiliary sciences as well as of forestry, I have no doubt that the importance of good forest management in India will in course of time lead to such improvements in the prospects of Forest officers sent out from England in regard to pay and pension, as will induce promising young men to come forward. The development of an efficient system of professional training for the superior forest service will then follow as a matter of course.

When the organization of the Indian Forest Services has been completely carried out, Forest Rangers and other executive officers will probably occupy a position analogous to that of the class of Oberförster in Prussia. For a long time to come it will not be feasible to provide for Forest Rangers in India that thorough professional training, which administrative forest officers in Germany receive. So much more needful does it appear that the officers of the superior staff, who will be employed in the direction of affairs after having spent the first years of their Indian career as executive officers, should receive a complete scientific and professional training. The number of these superior officers is necessarily small, but for a long time to come the initiative in professional matters will mainly rest with them, and mistakes made by them will have far reaching and mischievous effect. They ought to be picked men, thoroughly familiar with the science and practice of forest management in Europe, and with the experience gained in forest administration in those countries where it is best understood.

D. Brandis.

FOREST PROTECTION IN AJMERE.

The following notes have been drawn up showing the results of forest protection in Ajmere.

Influence of protection on growing timber stock.—I have divided this into forest conserved since 1875, and forest conserved since 1883. In treating of the older blocks of Merwara, where the hill-sides were not clean cut, it is astonishing to see the marked difference between the coppice shoots, and young trees inside and outside the forest, the one growing quite straight with poles well adapted for household purposes, the other crooked and small. This fact has become so very marked, that the villagers even are not blind to it; and though averse to any extra trouble, they always send in an application to be allowed to cut the wood from Government forest, when they might cut it from the open forests round their villages (where such exist) with little or no trouble. The reason being, as they themselves say, that they get good, straight and sound poles from the forests. The inferiority of the growing stock outside is due here to excessive lopping, chiefly for grazing. Fires do no damage, as there is no grass to burn. During my inspection of the Marwar forests last year, I was agreeably surprised by being asked by some of the villagers on the outskirts of the Todgarh range, to allow them to cut poles and plough shares from Government forests. This appeared strange, and on questioning them, I was told that the wood from the *Sirkari* forests was very straight and sound and of a superior quality; there was no disputing this point, even though the stretches of hill-side covered with forests in which these villages lie, are much larger than the Government forest. This inferiority of the growing stock can only be put down to fire and grazing.

The following extract from my report on the Jodhpur forests supports this view :—

"It is the interest of the Istimrardars and villagers to protect their forests from fire, not with a view of bettering the growth and obtaining a better quality of grass, but because these tracts supply all the grass upon which the cattle subsist during the summer months, and if this were lost, and the season at all a bad one, the country would fare very badly. Knowing this, I was pleased to hear that when a fire breaks out in an Istimrardar's forest, all hands are ordered out to try and extinguish it, but then with all their good intentions no amount of help can extinguish a forest fire in these hills without a proper system of fire conservancy. * * * * The forests have suffered very badly from fires. Last year a very disastrous fire swept through the whole of the forests south of Kot (bordering the Government forest at Dawer), leaving numerous burnt stumps to tell the tale. Matters are only made worse when a forest is preserved for two or three years, and then allowed to burn. The rubbish collected only helps to make the fire burn fiercer, doing far more damage than otherwise; as has been painfully illustrated in this case. It was pleasing to see the contrast in the Dawer Government forest, where a fire-line helped to check the fire."

Regarding grazing in these forests, the following is also taken from the same report :—

"At present there are no restrictions to grazing both of horned cattle, sheep, goats and camels. I was much distressed to see the damage done by sheep and goats, which, when fodder is somewhat scarce in the plains, come up in large herds into the hill forests to graze. Camels also wander in large troops through these hill forests, doing no end of damage; so that altogether the forests are slowly but steadily going from bad to worse."

In conclusion, I would here remark that the principal wood used in these parts, both for household purposes, for fuel, and to a certain extent for agriculture, is *Anogeissus pendula*. This tree, though found here and there in the Ajmere District, is very plentiful in the lower three-fourths of the Merwara District, forming nearly the whole growing stock of the forest. It is very sensitive to ill-treatment, and where continually cut and grazed down by goats and camels, I have actually seen it assume a prostrate form over considerable areas, lying quite close to the ground. The whole of the hill-sides along the road to Todgarh in the Merwara district illustrate this.

In dealing with the forests conserved since 1883, I am able, through personal observation, to state with confidence, that the change in the growing stock of these blocks, through keeping out grazing and fires, has been very great. I will deal with the worst stocked block of those taken up—the Makerwali Hokran one, situated three miles from Ajmere. The growing stock of this block consists chiefly of *Anogeissus pendula*, *Rhus mysorensis*, a few *Grewias* and *Euphorbia*. I recollect how astonished I was on my first visit to this tract to see the very peculiar way in which one and all of the above plants, except the *Euphorbia*, were growing. I cannot better describe them than as low, thorny, patchy scrub, each bush being nearly flush with the ground, only half a foot high and 4 feet across, with little or no leaf on the outside, and covered with what appeared prickles, but which were really the ill-treated branches quite hardened. All this was due, first to the growth being cut down, and then to the coppice shoots being grazed over by goats and sheep. This was the state of the growth before the block was taken up as a forest reserve. The results even after so short a time of conservancy have been marvellous. Out of these prickly patches numerous straight coppice shoots have sprung up; in some cases as high as 2 or 3 feet, while the entire bush is covered over with leaf. The growing stock of the other block lately conserved is very promising. Good healthy shoots being thrown out compared with the short stunted ones in the open forests which are continually being grazed over.

Reproduction.—Under this head I can safely say that there is little or no reproduction in the open forests of both the Ajmere and Merwara districts. While in the protected areas, closed to grazing and fires, the number of seedlings of different ages are

very numerous, in fact in places they literally cover the ground wherever there are any seed-bearing trees. Of those which exist in any great numbers I may mention dhau, saler, kumpta (*Acacia rupestris*) and khairi (*Dichrostachys cinerea*). This chiefly relates to the Merwara district. In Ajmere the hill-sides and plains have long ago been very nearly cleared of all growth except *Euphorbia*, so that the reproduction is carried on to a great extent under different circumstances. Here the *Euphorbia* takes the place of foster-mother, and under its friendly shade hundreds of seedlings, sprung from seeds carried by wind and birds, may be seen. Out of all the stretches of *Euphorbia* in the open forests few or none of these seedlings appear, while in the protected blocks nearly every *Euphorbia* shelters a plant beneath it, and in most cases even after such a very short time of conservancy, this plant overtops it.

Of late whole stretches of *Euphorbia* in the open wastes round about Ajmere are being cleared, not for the purpose of making the land available for cultivation, but merely for sale. The consequence is that the land has been laid quite bare, and where I recollect a couple years ago having seen a few *Acacias* and nim cropping up over the *Euphorbias*, there is not a trace of any description of tree growth, and little or none of grass and scrub.

Adjoining the Government forest in Merwara are the Marwar forests of an area much larger than that of our reserves. In inspecting these forests last year I could not help being struck with the great want of established seedlings, which were few and far between, though there was by no means a lack of seed-bearing trees. This was easily traced to fires from the appearance of the scorched trunks scattered all over the forest. Last year the greater part of these forests were preserved against fire, and numerous seedlings have sprung up during the rains; but this is of little value when perhaps the fire of next year or the year after will destroy them all. One other point in connection with reproduction by seed I would mention, and that is the reproduction of khair. This year I saw numbers of seedlings of this tree within our protected forest of the Merwara district. The khair is by no means found in any quantity in these forests, but from the results already obtained in the number of seedlings now beginning to show, the feature is very promising. On the other hand, when going through the Marwar forests, where there are considerable areas of pure khair (now fast disappearing), I did not come across a single seedling even after a very careful search; this appeared to me to be chiefly due to forest fires, which have of late years been very severe in this part of the Jodhpur forests.

The reproduction by coppice shoots has been dealt with at some length in dealing with the growing timber stock. The results obtained by experimental cuttings, though only 2 to 5 years

old, have been so very encouraging, that large areas have been selected for coppice yearly—this will enable a good deal of the previous ill-treated stock to be got rid of. The following gives the average measurement of coppice shoots :—

Cut 5 years ago—

Dhankra (*A. pendula*); girth 6 inches, height 10 feet.

Cut 2½ years ago—

Babul; girth 6 inches, height 10 feet.

Arinja (*Acacia leucophlœa*); girth 6 inches, height 8 feet.

Khejra; girth 7 inches, height 12 feet.

Cut 3 years ago—

Saler; girth 6 inches, height 8 feet.

Undergrowth.—The undergrowth consists chiefly of *Rhus mysorensis* and *Zizyphus Nummularia* and a species of *Indigofera*, which is fast covering the ground in all the Ajmere protected forests.

Though found in the outside forest it is fast disappearing there, whole areas being cut and the roots dug out for sale.

In the Merwara blocks, except where blanks and saler, gol and other open forests exist, the undergrowth is not very luxuriant; as *A. pendula*, owing to its dense shade, does not allow any undergrowth except a few grasses to grow under it. In the outside forests there is little or no undergrowth.

Grass.—In this lies the great value of these reserves. The immense help which these forests afford to the agricultural population of this district is only really appreciated in years of scarcity. It will always be a matter of regret that the area of these forests is so small, and that they cannot be farther increased without placing undue pressure on the villagers. The village reserves, which may be styled district grass reserves, will soon be started. These if managed according to the plans laid down, will help us somewhat out of the difficulty. It is a matter of doubt however, whether the villagers, who are to have the management of these reserves, subject in some degree to the control of the District officer, will take a proper amount of interest in their own affairs. The experiment is nevertheless worth trying.

At present with regard to the open wastes, grazing is in a very bad way. The cattle lead a most precarious life, dependent solely on the state of the rains. Even with a very good rainfall, from indiscriminate grazing, there are very few places where the grass is allowed to grow up, so as to be of use during the winter and summer months. The consequence of this is that these open wastes produce less grass year by year, leaving large open blanks without a vestige of any vegetation; a very unsatisfactory state of affairs.

With regard to the reserved forests the state of affairs is quite different. Whole hill-sides are covered with a very luxuriant growth of grass, which is increasing year by year, for

on several occasions, I have noticed hollows on the tops of bare rock, into which rubbish has been blown, this has now formed mould, and grass has sprung up evidently from seed blown there by wind. The following extracts, taken from my annual report for 1884-85, may be interesting, as they go to show the advantages gained by the villagers in the protection of these reserves :—

"Owing to the very short monsoons of 1883 and the scarcity of fodder in the open village forests, the whole of the Merwara tracts were thrown open to grazing. In Ajmere wherever the villagers applied for grazing, grazing was allowed them till the rains set in; by this means many cattle that would otherwise have perished from want of food were saved. * * * The number of cattle admitted into the forest to graze were 13,086 compared with 5,279 allowed to graze the previous year. Villagers who had no rights within the protected areas were also allowed to take advantage of the Government reserves. The following figures are quoted from the same report to show the value of the grass cut and carried away by villagers free from these Government reserves :—

Name of District.	Head-loads brought out from forest.	Value, Rs.
Ajmere, ...	210,000	13,125
Merwara, ...	530,000	33,125
Total, ..	740,000	46,250

"The figures for the number of head-loads in Ajmere is very nearly correct, for Merwara a fair approximation has been taken. Regarding the value of the grass the low sum of 1 anna per head-load has been fixed."

Influence of improved forest growth on the water supply.—Before dealing with any one of these heads, I should like to mention that the results at present obtained, as far as the water supply is concerned, are still in their infancy, and do not prove anything one way or the other. I do not believe that there is any part of India more favourably situated than this district for the experiments undertaken, and I have not the slightest hesitation in saying that another 10 or 15 years will see us in a fair way to definitely decide many of the different questions now brought forward. I will now take up each head.

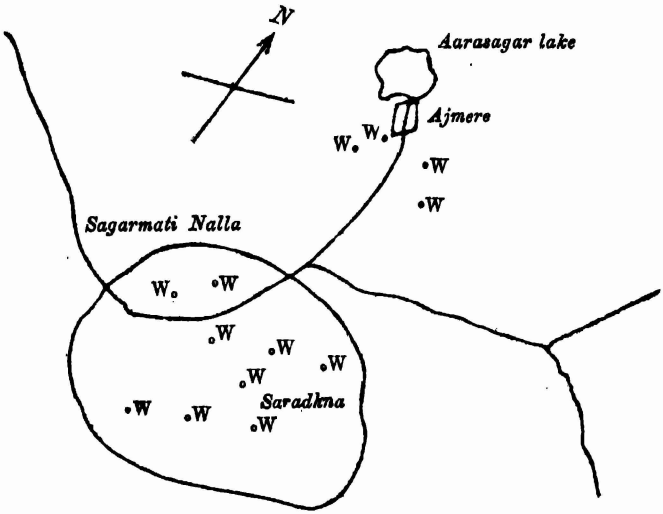
Continuity and supply of water in springs.—This experiment has only been started this year. The difficulty being in finding suitable springs among the dry hills of this district. In almost every case where they exist, the forests have been more or less untouched, owing to the vicinity of some temple or another. I may here mention that it is a custom in these parts to preserve all trees round about temples. These are considered

sacred, and ill-luck is supposed to overtake those who even cut a branch.

Only in the case of two springs situated in the Bari Nal and Imli Kund, both in the Tárágurh block, have anything like definite results been obtained. The following is an extract from Mr. Moir's report when the block was first taken up :— "The greater part of this tract when taken up, was altogether barren and denuded of tree vegetation." Such is by no means the case now ; in fact the Bari Nal and Imli Kund portions of this block, comprising more than three-fourths of the area of the block, is so completely clothed with seedlings and coppice shoots from 4 to 6 feet high, chiefly of saler, that there is not the slightest necessity for artificial planting just at present, and all this in 9 years only.

To return to the springs. When in 1883 I visited the place both springs were running, even as late as the beginning of May. When noticed by me again after the rains of 1883 (the monsoon was partly a failure in this year, the Ajmere register showing only 17·40 inches), the springs were running up to December, when the Bari Nal one dried up and Imli Kund had very little water in it. After the rains of 1884, which were exceedingly good, the Bari Nal spring was completely dry by the end of September, and the Imli Kund nearly so. The streams on the banks of which these springs are situated only ran once, though the rain was very heavy at times. During the present monsoon, which is exceedingly good with very heavy falls of rain at times, the Bari Nal spring is perfectly dry, and not a drop of water has come down from the hill-sides to enable the stream to flow. I may also mention that a well situated not far from the spring has also dried up during the hot weather, and with all the rain we have lately had, has not a drop of water in it. Regarding the Imli Kund spring there is just a little water, and if the present rate of drying up goes on, the spring will cease altogether next year.

Now I have no doubt that the benefits derived from the moisture percolating into the soil within forest limits does good to some wells outside, but at present it is still an open question how far from these limits this good extends. After careful observation I have found that none of the wells situated outside, close to this forest, have derived any benefit. To illustrate how very difficult is this question, of percolation affecting wells, I will mention one of many cases, where after a very long experience it has been found that the wells situated within the vicinity of a very large tank, the Ana Sagar, are benefitted but slightly, while wells 10 to 11 miles away are really those which derive benefit from the water of this tank. The accompanying sketch gives the relative positions of these places. The experiments now being started in connection with wells and springs will, I hope, tend to the solution of the problem.



W. Wells deriving little or no benefit
W. Wells deriving a great deal of benefit.

Sudden floods.—In treating of this head there is no disputing the point that forest growth has checked sudden floods. Numerous illustrations of this can be seen in all the forest blocks which have been conserved for the last 9 years. One or two examples will suffice ; for instance, the Tárágarh block which has been referred to in reference to springs. That the Bari Nál stream came down with a great rush before the forests were taken up, is proved by the remains of an old band which has been breached by the sudden floods, whereas now the water barely flows through it. Again, in the case of the Madár hill block, on the north-east of Ajmere, and within half a mile of the station, half of the hill has been conserved since 1876, the other half has remained open. The difference is surprising between these two halves at the time of a good shower of rain. While the water is running in torrents down the ravines on the open side, very little water is seen running down the ravines in the protected area.

Collection of water in tanks and wells.—With reference to tanks, the matter is still an open question to be proved or

disproved by the experiments now started. Only in one case in this district, and I might almost safely say in the whole of India, has the entire catchment area of a large tank been taken up as a forest reserve. The tract is situated midway between Ajmere and Nasirabad, and has an average rainfall of 20 inches. It was conserved in 1880, and the results have been anything but satisfactory, and decidedly at present against the idea that an increased supply of water in tanks results from an improved forest growth. A short description of its present state will, I hope, not be out of place. The geological formation consists chiefly of mica schists and quartzite very much broken up. The soil along the nallas is good and fairly deep, with water close to the surface. On the hill-sides the soil, just forming, is shallow and somewhat poor. The whole tract is covered over with a most luxuriant growth of grass, with numerous seedlings of nim, arinja, siris and babul cropping up out of the *Euphorbia* bushes, which are very plentiful. The seed-bearing trees are few, but nevertheless natural reproduction is good. The tract has lately been taken up for artificial reproduction, and the results of the last two years are exceedingly promising. I will now proceed with the matter connected with the supply of water to the tank situated at the east entrance of the forest.

The Nasirabad Cantonment Committee have lately been urging that the growing forest has been doing much damage to their water supply, which is taken from this tank, and though the rainfall last year was greater than for the year in which the tank was constructed (1877), the quantity of water which came into the tank has only been a tenth of what came in in 1877. The following figures are given by the Executive Engineer in charge Military Works :—

Practical Results, Danta Tank.

Year.	1878.	1879.	1880.	1881.	1882.	1883.	1884.
Rainfall at Danta, ..	18"	20"	12·64"	15·22"	25·38"	13·14"	18·70"
Quantity of water fallen into catchment area, in million c. feet,	110	122	79	92	141	84	115
Quantity collected in the tank, in million c. feet, ..	30½	20	7	11½	13½	1¾	3¼
Percentage of rainfall collected, in million c. feet, ..	0·28	0·165	·09	·12	·096	·02	·03

Remark.—Area of Danta catchment 1,688 acres (about 2¼ square miles) = 73,539,475 square feet.

These figures are not satisfactory, but it appears that the tank received very little water from the monsoon of 1884. The monsoon of 1883 was nearly a failure, and owing to this the tank dried up early in January; so that when the monsoon of 1884 set in, the first showers went simply to moisten the soil which had been parched during the hot weather. The evaporation from the dry hot catchment area was also enormous; so that all the light showers had no other effect than to wet the outer covering a very little, but caused no flow. From experience it has been found that a fall of less than 1½ to 2 inches in 24 hours does not assist in filling a tank. Judging from the very satisfactory way in which this block is progressing, both in artificial and natural seedlings, I have no doubt that in a very few years more water will be retained in the soil for sub-surface flow. The evaporation from the surface of the tank has been calculated to be $\frac{5}{6}$ths of the water coming into the tank, and as the air is rendered moister by the continual evaporation of the foliage, there will be less evaporation from the surface of the tank, which will become more and more shaded along its borders by the forest growth. There is also the hope that there will be a considerable quantity of sub-surface water gradually flowing into the tank as the cover overhead increases in the catchment. With reference to wells, it appears from general observation, though the matter still requires to be proved by experiment, that the water level in all the blocks has been considerably raised by forest conservancy. This seems notably illustrated in the case of the well in the bed of the Danta tank, which is brought into use when the tank happens to dry up. Though a very considerable quantity of water was taken from this well in pipes during the hot weather of 1884, for the Nasirabad cantonment, the water level at the commencement of each day was very little lowered, showing that the whole time the sub-surface flow was maintained. I have also noticed that in wells dug within forest limits water was found at a very much higher level than in wells outside, even though the stratification and general conditions were very nearly similar. As an example in point, I may mention the case of the Danta block, where three wells have been dug in one of the streams within forest limits. Water was found in every case at a depth of not more than 15 feet, whereas at the base of the western slope of this same range, and where the rock and soil are very similar, with the stratification somewhat the same, but with the hill-side nearly bare, and with little or no grass, the water was reached at a depth of 25 feet. There is no doubt that the experiments now undertaken will give valuable results in a few years.

Precipitation of moisture.—Under this head I cannot do better than give the results of last year taken from the rain-gauge stations established in and out of forest limits.

Month.	Mohwabir, Area of Forest 1,882 acres.				Madar Hill, Area of Forest 930 acres.				Nag Pahar, Area of Forest 2,660 acres.				Bajrangarh over the Ana Sagar band.	
	In Forest.		Out of Forest.		In Forest.		Out of Forest.		In Forest.		Out of Forest.			
1884.	In.	C.	In.	C.	In.	C.	In.	C.	In.	C.	In.	C.	In.	C.
June, ...	4	42	3	75	2	45	2	54	...	...	...	...	2	27
July, ...	7	83	7	...	4	75	4	52	5	...	4	12	6	24
August, ...	4	36	4	14	6	67	6	68	4	58	4	72	3	82
September, ...	10	87	10	10	12	17	12	34	9	67	7	53	9	96
October, ...	...	2	...	2	...	...	...	...	...	...	..	...	...	11
November, ...	...	22	...	25	...	22	...	19	...	8	...	11	...	20
December, ...	...	...	...	...	...	2	...	3	...	...	...	...	...	...
Total, ...	27	72	25	26	26	28	26	30	19	33	16	48	22	60

Remarks.—The stations were only erected in June, so that this does not show the total rainfall for the year, as rain fell in January, February, March and May.

In Mohwabir the distance between stations is 1,232 feet.
In Madar hill " " " 2,161 "
In Nag Pahar " " " 9,195 "

Before any definite and reliable results are obtained these experiments will have to be steadily carried on for a number of years, owing to the rains of these districts being so very local. A difference in the rainfall of as much as 6 inches during the year, between places not more than 10 miles apart, is by no means an uncommon occurrence.

Counteracting erosion, preventing landslips, contraction of beds of water-courses, &c.—Here the closed areas show a very marked improvement, each block affording numerous illustrations under the above heads. Whole sides of spurs, that three years ago consisted of nothing more than a heap of broken stones, with all the soil washed out of them, not affording sufficient nourishment for the growth even of grass, are now fast becoming covered not only with grass but with numerous seedlings. The Rajgarh and Danta blocks afford numerous examples of this. I have no doubt that the older conserved blocks, now fairly well covered, were more or less in the same state as the new blocks. Traces of the broken patches of rock can still be seen on a close inspection. There is also not the slightest doubt that the protection of forests has contracted the beds of water-courses, causing the water that flows from the hill-sides to run in a narrow definite bed, the rest of the original stream being

covered over with deposits of silt, which is covered over with grass and numerous seedlings. The Mendi-khola in the Mohwabir block affords a most striking example. Where the stream runs through forest lands, and a hundred yards below, it was nearly 30 feet wide at one time, but has now silted up very nearly to the top, with only a very small channel for the waterflow. Beyond this, where numerous small streams, not under protection, join the main stream, the bed maintains its original width, with a rocky or stony bottom.*

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ON TOUR WITH THE STUDENTS OF THE FRENCH FOREST SCHOOL IN THE VOSGES AND JURA.

BY A LADY.

AFTER experiencing a few days of great heat at Nancy, we were not unwilling to exchange it, on the 24th of May, for the fresh breezes of the Vosges mountains. We were a large party, 37 in number, including students and professors.

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* The following notes from Ebermayer :—Die Physikalischen Einwirkungen des Waldes auf Luft und Boden, *will illustrate* the subject.

	QUANTITY EVAPORATED IN CUBIC INCHES FROM A SQUARE FOOT OF SURFACE.					
	Free water surface.		Soil with no undergrowth or grass.		Soil with undergrowth, grass included.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
Out in open,	17	2	15	6	..	..
In forest, ..	7	1	7½	1½	3	1

(*a*). Forest growth without immediate ground covering reduces the amount of evaporation as compared with evaporation from an open field 62 per cent., and the evaporation under forest is 2·6 times less than in the open.

(*b*). In the open the immediate ground covering diminishes the evaporation from the soil by 22 per cent. at the most, and 1·3 per cent. at the least.

(*c*). Forest and the immediate ground covering together diminish evaporation by 85 per cent.

(*d*). Evaporation from forest with immediate ground covering is less by 60 per cent., or 2½ times less than from a forest which has no immediate ground covering.

In other words :—

If 100 volumes are evaporated from the soil out in the open, forest without immediate ground covering evaporate 35 volumes, and forests with immediate ground covering 15 volumes.

If forests without immediate ground covering let out into the air 100 volumes, forests with immediate ground covering let out 40 volumes.

At first there was nothing remarkable along the route, but after leaving Laveline, the train ascended the valley of the Volagne, and every turn brought us into prettier scenery, the hills on both sides being covered with fir trees, looking their brightest and best with the young shoots of spring fresh upon them. We were amused at the salute bestowed on the *sapins* (silver fir) by the students, who, following the lead of the professors, took off their hats as we passed the first trees of this species and entered the forest. The railway was bordered on either side by close cut hedges of spruce fir, which looked very neat and trim.

We reached Gérardmer in the evening, after a shower of rain had freshened the ground and rendered the air very cold and keen after the last few days of heat. The *Hotel de la Poste* has a fine dining-hall capable of seating 150 people, and a splendid *salon*, with a polished oak floor, most tempting to the lovers of the dance. We were informed that the piano had been removed on the arrival of the students, lest they should be tempted to indulge in the "light fantastic" in heavy boots, to the detriment of the polished boards.

There is a nice garden attached to the hotel, and beyond it some fields of wild flowers, which are very abundant and beautiful in Gérardmer, and then comes the lake, which forms the chief attraction of the place. The eastern extremity of this sheet of water is somewhat open, but the western end is almost enclosed by hills, rising out of the water, and thickly wooded down to the water's edge. There were some steady-looking flat-bottomed boats plying on the lake, which seems to abound in fish, many being seen disporting themselves on the surface of the water in a manner most tantalising to an angler who had left his tackle far away in England.

We took but a cursory glance at our surroundings that evening, but the next morning, while the students were engaged in triangulating the country, we strolled out to look about us. Gérardmer is a summer resort something in the style of an Indian hill station, but with this exception that an Englishman is seldom to be seen there. It receives an occasional visit from an English cabinet minister, but such a thing as a Cockney tourist is unknown there. It is evidently a favorite resort of French people, for the charming landlady assured us that they seldom have an empty room during the summer. This may in some measure be due to her influence, for her bright smile and cordial welcome were very attractive. The cheerful manner in which the landladies of the various auberges in the Vosges render their willing services seems to be characteristic of that region, and compensate the traveller to a great extent for the somewhat rough and ready appliances placed at his disposal when visiting the smaller towns or villages. But at the Hotel de la Poste the arrangements are perfect, and the visitors are

made thoroughly comfortable. Grouped round the eastern end of the lake, are some very pretty villas, standing in their own flower gardens, which extend down to the margin of the lake; but these were as yet unoccupied, their owners being unwilling to relinquish the attractions of the towns at this early stage of the season.

It is an easy walk of an hour and-a-half on well kept paths round the lake, but to our amusement a section of the French Alpine Club, which arrived during our stay, found it necessary to engage all the available carriages to enable them to make this little promenade. In front of our hotel stood a very fine elm tree, planted 200 years ago, to which we looked in our rambles on the adjacent hills as a landmark to guide us home. The annual fair took place while we were there. The single street presented one morning a lively appearance, being lined with booths which seemed to have sprung up in the night. The men in blue blouses and the women in white caps and aprons, all shod with noisy *sabots*, praised their rough wares as we passed, and tried to induce us to believe that the like were not to be found elsewhere. Their chief merchandize seemed to consist of pigs of all sizes and qualities, but all alike in their determination to go in a contrary direction to that in which their owners were trying to drive them, and contributing in no small degree to the noise of the fair.

There was a sad *finale* to the two days' amusement; some of the travelling shopmen who had imbibed rather freely had a disagreement, which ended in the murder of one of them, and in the arrest of another, who, however gave himself up without attempting any resistance. The next day a number of officials came down to make the necessary enquiries, which were soon over, and after the table d'hôte dinner these gentlemen left by the evening train.

We went for an excursion to a pretty place called the *Saut des Cuves*, a small foaming torrent which tumbles headlong down its steep rocky bed; though not large, it forms, with the rustic bridge thrown across it, a pretty picturesque scene. Not far from it, is a large flat stone which bears Charlemagne's name, and on which he is supposed to have rested his weary limbs, but whether that ancient warrior ever really sat on it is a question on which it is difficult to speak with certainty. Then we wandered on through the beautiful fir forests till we came to another rustic bridge called the *Pont des Fées*. The *Club Alpin Français* takes the greatest care that the unwary traveller shall not lose his way, for at every turn one meets with notice boards pointing out the direction in which the visitor should go in order to reach the various objects of interest, and also the way home, in case he should feel at all fatigued by an excess of beautiful scenery. Even the smallest streams and forest glades have been named by the club, and we several times found our-

selves hunting for cascades or torrents to which the boards guided us, the little trickles referred to having passed unnoticed under our very eyes.

We went with two of the professors to visit two interesting manufactories, one for converting wood into pulp for the making of paper and the other for making felt.

The wood used for the pulp consisted of round pieces of fir, 1 metre long and 3 to 9 inches in diameter. Each piece is cut into three billets, by means of a circular saw, and these short lengths are then put into a machine which shaves off the bark and leaves the wood clean. The knots are then bored out with an auger, and the round block split into two pieces. These billets are then pressed against a revolving stone in a hydraulic machine, the result being that the whole substance of the wood is reduced to fine atoms held in suspension in the water. This water is then passed through various strainers to remove all larger particles, and it ultimately appears simply as turbid water. The water is then strained off leaving a wet pulp, which is spread upon cloth and pressed between rollers so as to dry it. The flakes of dried pulp are exported to be used for making paper. All the constituents of the wood are in these flakes. We could not ascertain anything about the cost of the work or the profits made, but the woods used are spruce and silver fir, the two species being kept separate as they yield pulp of different colours.

After this we proceeded to inspect a felt manufactory. The wool was spread in very thin layers, one over the other, to make a thick soft mass, and this is pressed with water between rollers into a close substance. We saw hats formed on revolving blocks in the same manner. Rolls of felt were also made for shoes, and we were shown a piece of felt of graduated thickness made for the hammers of pianos, the price of which was about 125 francs per square metre.

The great industry about Gérardmer seems to be the making and bleaching of linen. The eye is attracted by conspicuous patches of white which cover large parts of the fields in all directions. There are yards, one might almost say miles, of linen spread out to bleach in the sun while it is kept constantly wet by a man in charge. Near the linen are seen small sheds, not unlike those from which the Himalayan hillman watches for the bears during the ripening of his crops; but they are to shelter men who guard their property against any human foe who might feel inclined to appropriate the linen. Every little cottage seems to contain a loom, and the peasants one meets leaving the town are generally carrying on their backs loads of linen thread, which they convert into cloth in their cottages. We visited a large factory, employing numbers of hands, where we saw the linen pass through all stages until it was completed. It was an interesting, busy scene, but very deafening, and one

could not interchange a word on account of the din caused by the machinery.

We went into an unpretending little shop to purchase a railway guide, and to our surprise discovered that the proprietor was an author, with his own printing press; he was very anxious to dispose of his books, telling us that the last Englishman who came to his shop took dozens away to circulate in England, and evidently implying that we might do the same.

We visited the church, which contains the usual number of little niches with draped figures of the Virgin, and does not differ much from other French village churches.

We must not omit the cheeses which form one of the principal productions of Gérardmer, and which always made a most obnoxious addition to the otherwise good table d'hôte dinner. Even at a distance one wished them further, and in self defence we were compelled to request the waiter never to present them to us.

Another speciality of the place is the walking stick made out of stunted fir trees with the end turned round to form a handle. The peasants cut them down, hang them for a winter over their kitchen fire till the smoke has browned them a dark colour, then add an iron spike and polish them for sale. They are more curious than pretty, but prove a most useful companion for a mountain climb. The great excursion from Gérardmer is to the top of the Hohneck. The carriage road winds through the beautiful valley for some miles, almost every turn opening fresh scenes of beauty before the traveller's eyes, it then turns upwards to the pass by a series of zigzags, whence is obtained the finest view of all looking down on the two lakes, Longemer and Retourmer, which lie embosomed in fir-clad mountains rising straight from the water and seeming to guard them on all sides. The drive terminated at the pass, *La Schlucht*, where there is a prettily situated inn, the view from the windows of which reminded us a little of the Himalayas, though the mountains are not nearly so grand. As a rule, the Vosges mountains are characterized by round topped hills covered with bright green grass which the cattle keep close cropped. Here the crest of the ridge forms the present boundary between France and Germany, and along it a line is cut through the forest, or a ditch is dug where no forest exists, the line is also marked at intervals by small square granite pillars, bearing an (F) cut on one side and a (D) on the other.

We walked up the Hohneck (4,500 feet) guided by the ever-faithful boards of the Club Alpin Français, and we ought to have been rewarded for our climb by a good view; on a fine day one can see the Bernese Alps from here. The fates were, however, against us, for though at first the sun shone brightly on the valleys of France, those of Germany were shrouded in mist, which soon overspread the whole landscape; but a glimpse

through the clouds enabled us to see the town of Münster which is situated in a picturesque hollow below.

The sward was lovely, being covered with alpine flowers, conspicuous amongst which were the large white anemone and the dark purple pansy, which grows luxuriantly all over the Vosges mountains. We should have liked to spend a long time gathering these mountain treasures, but the ominous clouds and distant rumble of thunder warned us not to linger. During our drive we had passed through large forests of silver fir and spruce; these in the higher regions give way to stunted beeches, which the cattle have reduced to a very poor condition by their constant browsing. It was very cold on the hill tops, and in sheltered places snow was lying, some of which will probably remain throughout the summer. On our way down we interviewed a cowherd, and found he spoke only German. This is a splendid pasture country, the grass being so nourishing that the cows require no other food, and on all these mountains, the butter is always good and rich; in the most primitive of auberges, producing the sourest of bread, we could always depend upon the beautiful butter. The clouds, which had been threatening all the morning, burst upon us before we regained the inn which stands on the very boundary line between France and Germany, and we were very glad to avail ourselves of its shelter. Several other travellers more or less wet came trooping in, and we were amused to see how the Frenchmen arranged themselves round the table on the French side of the room, while the Germans occupied that on the opposite or German side, there being no intercourse between the two tables.

Our drive back to Gérardmer was unfortunately made through pouring rain. We took another road which passed along the margin of lakes Longemer and Retourmer, the view of which from above had so much enhanced the beauty of the scene on our way out. All we could now do was to peer occasionally at the prospect from under the hood of our carriage. We could not summon courage to run 100 yards through the heavy rain, to see a cascade, which, from the numerous photographs one sees of it, must be very pretty.

The next day was Whit Sunday, a great day at Gérardmer. In the morning there was a Confirmation, an event which only takes place there once in three years. They had a cold bleak day for it, and the white muslin apparel donned by the young candidates looked very unseasonable. The youth of Gérardmer having been confirmed in the morning, made the most of their day by devoting themselves to skittles in the afternoon, and to a theatrical performance, consisting of *La Fille de Madame Angôt* and other pieces, in the evening.

We had a delightful scramble in the afternoon, gathered more beautiful wild flowers, and what is even prettier, the

sprays of pink feathery grass which are found all over the Vosges, and which give the fields a rosy tint. We found the view towards Remiremont very pretty, and we wandered on, following the notice boards of the C. A. F., in search of *La Vierge à la Creuse.* By enquiry we learnt that we were in search of a rough stone, bearing an exceedingly rough painting of the Virgin, which we had passed as unworthy of special notice.

Whit Sunday is a great day with the Club Alpin Français, and they mustered in force for dinner, occupying a table specially prepared for them. The party, about 50 in number, consisted more of ladies and children than of men, and when we saw them we were not surprised at their having requisitioned all the carriages to make the tour of the lake.

The next day we took a walk with some friends to hear a remarkable echo, and then said good bye to Gérardmer, and left to join the junior Forest Students class which was on its way to another part of the Vosges and the Jura to study sylviculture under its professor.

Having spent a very pleasant fortnight at Gérardmer, during which the *Anciens* were engaged in surveying, we started for St. Maurice, joining on the way the *Conscrits* with two of the professors; and now, after a stay in the luxurious hotel at Gérardmer, hard walking with comparatively rough accommodation was to be the order of the day. We were unfortunate in having the most deplorable weather, which robbed our ramble in the Vosges of much of its pleasure. Our party, about 40 in number, put up at the Hotel de la Poste, which seems to be the favorite name of the hotels about here, and after an abundant but somewhat rough dinner we retired early, as we were to make a start at daybreak for the ascent of the *Ballon d'Alsace.* We breakfasted at 6-30, and then immediately commenced the ascent. The sky was overcast, and we were hoping earnestly that the clouds would clear off, and that we should see from the summit the beautiful view of which we had heard so much. But we were doomed to disappointment, for about an hour after we had left the hotel the rain came down, first lightly, then heavily, and all hope of the view melted away.

On our way up we entered a dense forest of silver fir. Here the director stopped to lecture, and explained that the chief enemies the trees had to contend with were wind and snow; he advocated that some of the dominant poles should be thinned out, where they stood close together, so as to render the top of the forest undulating instead of its presenting a solid table-like surface on which the snow is apt to be retained until the trees are broken by its weight. The poles are readily sold for conversion into paper pulp.

On our emerging from the forest the rain seemed much heavier now that the friendly trees no longer intervened to shelter us. Beside the road we saw a cross, erected to the

memory of a poor man who had been lost in the snow in 1867, and a little further on another to commemorate the death of a man who had been murdered there in 1850. The ground was covered with wild pansies, growing as brightly and as luxuriantly as they did on the Hohneck. The rain at last came down so heavily that we were compelled to avail ourselves of the shelter of a very rough mountain auberge, where, however, we obtained some excellent butter and Gruyère cheese, which, with the cold meat we had brought with us from St. Maurice, made a capital breakfast; but we Indians rather missed the services of the *Khitmatgár*, and the hot breakfasts that seem so easily produced at any part of the jungle. After this we continued our weary ascent through clouds and rain to the summit, and having waited in vain for a glimpse of the magnificent view, we descended the hill by another road. For a few minutes the clouds cleared and we saw one of the outworks of Belfort in the distance. Here, as on the Hohneck, the Franco-German frontier boundary follows the crest of the hills, and is marked by pillars and ditches. On our way down we visited the forest house, which is very prettily situated overlooking the beautifully wooded valley, and a gun was fired that we might hear the echo reverberating through the hills. We returned after this to St. Maurice, and were glad to find our boxes, which enabled us to change our wet garments and indulge in a cup of tea before starting by train for Remiremont, where we arrived in time for dinner. We were such a large party that we dined by ourselves instead of joining the table d'hôte. The director stood champagne to the whole party, healths were drunk, speeches made, glasses clinked, and every one appeared in the best of spirits.

The next morning we went out and ascended a slight eminence, called *La Calvarie*, from which there is an excellent view of the old town, which is picturesquely situated in the valley of the Moselle, the hill sides being clothed with vineyards. We also visited the old church, and were able, in spite of the frequent showers, to walk a good deal without getting wet, as the pavement is generally under cover of the projecting houses. We called on the director's mother, who has a nice house with a good garden, very well stocked with fruit and flowers; the rhododendrons were just coming into bloom, and a large number planted in one block had a good effect. We then took our places in the *coupé* of the *diligence*, and drove to Faymont through undulating fir forests. Here we dined in a very primitive little inn. The meal was sumptuous, endless courses succeeding each other, but the arrangements were somewhat rough, and the carving or rather hacking of the joints was remarkable. After dinner we left by train for Vesoul, where there was a very good hotel with spacious apartments. In all the hotels in the Vosges we found the landladies delightful, so

obliging and anxious to make everyone comfortable; but not one of the hotels seems to possess a bath, and we were very glad we had brought an india rubber one.

Every morning we were roused by the sound of the *cor de chasse* under our windows; it was sounded again for our meals and to warn us when to start for the various excursions into the forests. In primitive little villages it created quite a sensation, all the inhabitants gathering round Masseron to watch while he played. It was again very wet, but the students went to visit a very fast growing forest, where the oaks add about one centimetre per annum to their diameter. We had dinner in a kind of coach house, and then went by train to Gray; we rose early and explored the curious old town, part of which is built on a high plateau reached by flights of steps from below, on the higher level is situated the church and an old unoccupied chateau, into the grounds of which we penetrated, and from a walled terrace had a very pretty view of the river below. There were some rather good shops and some barracks, in front of which a circus was being erected. The dragoons were lounging about; they looked most slovenly with their loose ill-fitting tunics and trowsers, and are a great contrast to the smart English cavalry soldier. We entered the church where service was going on, but we did not like to attempt the ascent of the tower, whence no doubt we should have had a splendid view. We strolled into a shady garden, where the nightingales were singing sweetly. There is a fine suspension bridge at Gray, and the town is very old and quaint, the buildings being remarkable for their steep pent roofs.

In the afternoon we took the train to Arbois, and this brought us into the Jura mountains, which present a different appearance from the Vosges, in that instead of the tops of the hills being rounded they terminate in abrupt cliffs. Another remarkable feature of these mountains is that many of the streams rise in a considerable volume, which one would suppose to be the result of a course of several miles. Another contrast between the Vosges and the Jura is, that the latter have not been taken in hand by the Club Alpin Français, and therefore the Cockney appearance given by the numerous notice boards is absent. Our bad luck with the weather still pursued us. Torrents of rain spoilt all excursions, and our limited stay of one night in each place did not suffice to dry our dripping garments. The champagne at Arbois is rather sweet but very good. After the mid-day meal we drove across country to meet the Pontarlier train. The road was pretty, passing among the silver fir and spruce trees, and it ascended considerably before we reached the mountain railway. The clouds had been heavy and threatening all the way, and the storm burst just as we reached the station. The train was very crowded, and in our carriage were five Americans travelling

for amusement, but encountering considerable difficulties, as not one of the party could speak a word of anything but English (American). We tried to help them a little, but we soon had to part company, as they were going on, while we remained for an hour at Andelot, where we had dinner in the railway *restaurant*. Our company was not very select, for there were some workmen at another table who were rather merry over their wine and indulged in songs until stopped by the waiter. We then continued our railway journey to Champagnole, which we reached about 9 p.m.

The next day broke with torrents of rain and we relinguished the idea of walking through the forests to Andelot, where we were to have spent the night, for we heard such accounts regarding the limited acommodation available, that out of kindness to the rest of our large party we decided to go on to Dijon, which place they were to reach on the morrow. The rain cleared off after a time, and we took a walk and gathered a bouquet of the lovely wild flowers with which the Jura mountains abound. There are beautiful wild carnations, hyacinths and pansies, all sweet-scented, and the meadows are covered with the pretty pink feathery grass we had found in the Vosges. Certainly the wild flowers of the Jura mountains surpass anything we had previously seen for variety, beauty and abundance. The Alps are not to compare with the Jura in this respect, though the alpine flora is much admired. We walked on and got a good view of the range with its characteristic sharp-pointed rocks. We left Champagnole in the afternoon and reached Dijon that night. The day following we visited the botanical gardens, where there is a wonderful poplar tree remarkable for its great height and girth. There is also a natural history museum containing a variety of stuffed birds and animals. We also visited the Cathedral (St. Benigne) and the old desecrated Church of St. Philibert, also the Cathedral of St. Jean, which has been restored, and the ruins of the old castle, which has now been converted into a barrack. After breakfast we went to see some ancient houses in the *Rue des Forges*. Then we visited the Hotel de Ville, where there is a good museum containing some paintings and the monuments of the Dukes of Burgundy; in a glass case there are 36 decorations worn by the late Marshal Valliant. Every country seemed to have joined to decorate this much favoured individual, including England, which conferred a G. C. B. on him. We next ascended 314 steps to the top of the tower, which commanded a fine view of the surrounding country with its hills and forests. Here again the vineyards which produce the excellent wine of the country met the eye in all directions. Notre Dame was the next object of interest. It has a fine carved facade and a curious old clock, the hours being struck by hammer-men. Then we drove to the park, about a

mile-and-a-half from the town; this is simply a wood with drives and walks cut through it.

The roses in Dijon were very beautiful, but we looked in vain for the famous *Gloire de Dijon*, and could only conclude that perhaps it was not yet out. In the centre of the town is the Place d'Arcy, very prettily arranged with rose gardens and a fountain, in a small sheet of water, on which floated two stately swans. Dijon is just at the commencement of the sunny south; the air was warm and balmy, a pleasant change after the cold and wet we had just experienced in the mountain ranges. The next morning we paid another visit to the botanical gardens, and saw also the Well of Moses, with some fine old stone carving depicting scenes in the life of the patriarch. This is at the Old Chartreuse, which is now an asylum for idiots. We then invested in some photographs, including the pretty pathetic ones of girls in the national costume of Alsace and Lorraine, now, alas! no longer French. After this the entire party started by train for Nancy which we reached that evening, and thus ended a pleasant tour in the Vosges and Jura mountains, the inspection of whose noble forests doubtless proved very profitable from a professional point of view.

BENEFICIAL RESULTS OF THE SAU TREE ON THE GROWTH OF TEA.

DEAR MR. EDITOR,—Amongst your interesting notes collected during your peregrinations through Assam and elsewhere, you make a reference to the beneficial results of the sau (*Albizzia stipulata*) tree on the growth of tea. This subject only very recently excited a deal of attention, and was the sole topic of conversation in our "one-hobby" province. It was taken up earnestly by Mr. Buckingham of Sibságar, who drew particular attention to it, through a pamphlet he had printed and circulated by the Indian Tea Association (I think), in which the opinions of various Managers of Tea estates were recorded. The advocates of sau cultivation claim for it, that its effects are a more vigorous growth, and consequently a greater yield from all tea bushes shaded and protected by it; some, on the sole ground of visual observation without other reason, others, and they the majority, contending that the roots enrich or impart certain chemical properties to the soil beneficial to tea, the shade afforded being also a favorable factor. I happened to be in charge of a tea district when this subject was the nine days' wonder, and though my scope for observation was limited, not for lack of tea gardens, but sau trees, the opinion which I modestly put forth, not pretending to infallibility, may be useful if only to cause refutation.

Most tea gardens are without shelter of any description, and

the occasional tree found amongst tea, is more often the result of accident than design. The tea bushes are, therefore, at the mercy of the weather; a continuation of hot winds, an extra long spell of hot blazing sunshine, or a succession of wet days with cold winds, all affect the bushes to some extent, causing blight, burning up or hardening of tender shoots and leaves, &c. The casual observer would call for shade at once, but the experienced planter knows that the dense cover which most Assam trees possess, mean death to his bushes, and that the roots of others, like rubber (*Ficus elastica*), bhola, &c., are equally injurious. The happy mean was not sought for, till nature herself manifested what it is now asserted to be. Who claims the honor of reading nature in this aspect first, I do not know, but in the Mangaldai sub-division of Darrang, the influence of the koroi (*Albizzia procera*) had been discussed and acknowledged long before the "sau" excitement. This particular sub-division presents, with a few mediocre exceptions, very poor specimens of tea gardens and the marked difference between bushes shaded or not by koroi, was thus very striking. The tree has superficial roots, very small leaves, bears seed copiously and at an early age, and seems to spring up spontaneously wherever a clearance has been made, provided it is not in absolutely grass jungle. This is the case all over the Mangaldai sub-division and other parts of Darrang, also in Nowgong near the Sibságar boundary, and south of Deboka to the North Cachar Hills. It usually commences on the outskirts of bits of evergreen forest, which are surrounded by grass jungle, or amongst mere saplings, generally of inferior kinds of timber like akshi (*Dillenia pentagyna*), bhola, two species of Eugenias, and amlukhi (*Phyllanthus Emblica*), in which case there is almost certain to have been a former clearance, either for cultivation or charcoal burning; and is also found in the numerous little islands embedded in the larger streams, and on the banks of rivers, where the land is subject to occasional inundation. But it must be remarked that in almost all of these cases the land is considered too low to be very favorable to tea culture. Koroi trees also grow on the higher lands, but not to the same extent, and some of the clearances above referred to are abandoned tea gardens. My experience of the sau tree is somewhat similar, though it is not met with as frequently as koroi. It is not found to any great extent on higher lands, but is common in the Charduar plantation, which is low and subject to inundation, at odd and frequent periods during the rains. The leaves of the sau tree are smaller again than those of the koroi. Both trees grow fairly rapidly when young, presenting a lank, ill-conditioned appearance, but the process of growth is much slower as they approach maturity.

I should have premised by stating that my experience only

extends over two tea districts, and that their peculiar characteristics are what are depicted here, but I suppose there cannot be much difference elsewhere. I have seen tea bushes growing under both the sau and koroi trees, and have been much struck by their luxuriance in comparison with adjacent bushes, and have considered these trees the panacea for all tea woes. But a "change has come o'er the spirit of my dream," and no longer have I implicit faith in koroi and sau trees. Roaming promiscuously over two different tea gardens 60 miles apart, I found tea growing under koroi trees of great growth, and lo! the tea bushes under their shade were, if anything, inferior to those beyond it! A change of quarters immediately afterwards to where tea is not grown, has deprived me of opportunities for further observation, but it would be well worth the attention of well-informed observant men like Mr. Peal, to trace this further. My own experience therefore leads me to the belief, that no advantageous chemical properties are imparted to the soil by either the sau or koroi, and that it is only the shade afforded by them which is beneficial, and that only whilst they are young, for once they attain maturity and a great size, the shade, slight as it may be, becomes too dense, and the prolongation of the surface roots becomes inimical. All the evidence obtained hitherto, as far as I can learn, in favor of the sau or koroi, rests upon those trees seen when immature and of small size.

11th July, 1885. "ASSAM."

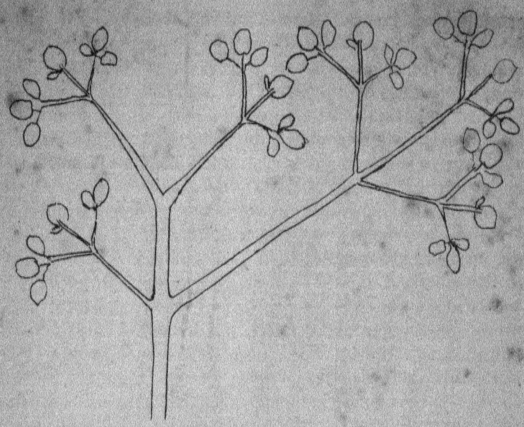
SEEDS FROM CAPE COLONY.

WE have received seeds of some South African trees from Mr. Hutchins, and have distributed them to the forest and botanic gardens at Ranikhet, Landour, Mussoorie, Chakrata, Simla, Ootacamund, and hope to hear of their successful germination, and of the future progress of the plants. The species sent are Sneezewood (*Pteroxylon utile*), Yellowwood (*Podocarpus elongatus*) and upright Yellowwood (*Podocarpus latifolius*).

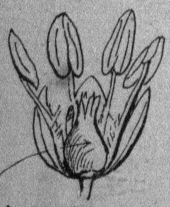
COLONEL MICHAEL'S METHOD OF CUTTING WOODS FOR EXHIBITION.

IN Col. Michael's Report on the Indian Section of the Edinburgh Exhibition of 1881, he says "the woods were cut here after a pattern which I introduced some years ago in Madras, and which was adopted there as a standard. This method of cutting woods for exhibition or museums was greatly approved by foresters here, and by the jury, who awarded me a special diploma for it, and it has figured in the *Gardener's Chronicle* of the 2nd August."

INFLORESCENCE OF THE MAIPHAK.

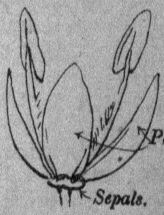


Anthers 5.



Ovary 5 seeded.

Enlarged 3 times.



Petals.

Sepals.

Occasionlly the anthers stand up well *above* line of Petal tips.

Sepals enlarged.

Natural size.

S. E. PEAL.

Litho. T. C. Press, Roorkee. THOS. D. BONA, *Supdt.*

Now that there is such a rage for collecting specimens, I am sure many would be glad to learn something more about this "pattern."

H. S.

THE MAIPHAK.

Mr. S. E. Peal writes as follows from Sibságar, Assam :—I have been watching the Maiphak for weeks, it is in bud, and I will send flowers, when out in a few days, to you and Mr. Gamble. One that I found open I dissected ; the calyx 5-lobed as in *Plate* (very small), petals 5, inserted just above, and in between the sepals, filaments 5, arise between and at base of petals, just above, filaments hairy, the ovary pear-shaped, apex cleft into 5 pistils.

The whole top of tree is covered with buds.

THE KADDAM FOR TEA BOXES.

Mr. Peal also writes—I am planting out Roghu here (*A. Cadamba*), and expect it will be fit to saw up in 8 to 9 years. Some were planted in June 1884, and now say 18 months old, are 24 feet high, and 12 and 14 inches girth. From what I see I think one inch per annum *radius* can be relied on for the first eight years, after which it gets slower and slower, down to quarter inch at 16 years. The plants are got from my tea nurseries, and no one so far can raise Roghu from *seeds*, but thousands sprout in all clearings.†

* Botanical specimens collected by Mr. Peal have now been sent to Kew for determination.

† There is also a difficulty about ensuring germination of the Huldu (*Adina cordifolia*), a plant allied to the Roghu or Kaddam, but we have succeeded in raising seedlings of the latter, in raised beds of fine charcoal dust, in the same way as *Ficus elastica* is sown in the Charduar plantation in Assam.—[Ed.]

II. Review.

FOREST DEPARTMENT (STRAITS SETTLEMENTS).

In July 1883 Mr. Cantley, Superintendent of the Botanical Gardens, Singapore, published a Report on the Forests of the Straits Settlements, and the result we are glad to notice has been the formation of a small Forest Department, with Mr. Cantley as Superintendent, assisted by four Europeans, under whom are some subordinate officers, together with a number of forest watchmen.

The report is largely filled with accounts of the topography, geology and meteorology of the country, and the description of the forests shows how greatly they need protection. In the introduction he says that—

"It is apparent that no sufficient attempts have been made to conserve the Government forest lands, and that nothing has been done towards utilising the extensive grass wastes that are to be seen throughout the Settlements. The present state of affairs is the result of a reckless, migratory cultivation carried on by the Chinese, and this extensive deforestation has brought with it its attendant evils. Our timber supply has fallen far short of the demand, and the climate of the colony is becoming sensibly affected."

The Straits Settlements are formed of four separate districts—

1.	The Island of Singapore,	containing	226	square miles.
2.	Malacca,	"	659	"
3.	The Island of Penang,	"	107	"
4.	Province Wellesley,	"	265	"
		Total area,...	1,257	"

The Government forests occupy about 121 square miles, or nearly $\frac{1}{10}$th of the whole area, the largest forests being found on the mainland in Malacca and Province Wellesley. In addition to this there are about 33 square miles of private forests, whilst the waste lands are extensive in Singapore, occupying about 10,000 acres in Malacca, but are scarcely of any importance in Penang or Wellesley.

The forests belong to that class known as evergreen tropical forests, which chiefly lie within the tropics and in countries subject to heavy annual rainfall, and a high state of atmospheric

moisture. Many of the trees are nevertheless deciduous for a very limited period, which in most cases extends over a few days only. The mean annual temperature is above 80°; the highest scarcely above 90°; the lowest not much less than 66°. The humidity of the atmosphere is generally very great, and in Singapore, counting saturation at 100, the annual average is 79·4, and is never below 78. The annual rainfall is about 100 inches, and roughly speaking there is rain every other day throughout the year. Mr. Cantley, however, says that, although—

"The total rainfall of the year has not decreased, owing to the removal of the tree covering—that great equaliser of rainfall—showers have become less frequent and more local than formerly; and droughts of unprecedented length have occurred, thereby increasing the possibility of epidemics. These fertilising showers, which once watered the whole surface of the Settlements, are now confined more frequently to the hill tops and higher elevations, the soil and the prospects of agriculture being thus impaired, and the temperature of the plains being raised. The hill streams run with greater irregularity, and many of the smaller streams have become entirely dried up."

In Singapore we find that—

"Such Crown forests as remain uncut are widely distributed in isolated patches over the island. These forest patches or clumps are of various sizes, from half an acre or so to about 25 acres, their distance from each other averaging about half a mile. The interspace is generally waste grass land, which supports as a rule only strong growing grass, which chokes any seedlings of forest trees which might otherwise spring up."

As an instance of the state of the forests in Malacca, we quote the description of the state of the Jus reserve of 25,000 acres, and of the Kesang reserve of 2,000 acres.

"The amount of well-wooded land does not exceed, I believe, one-third of the total area. Within the reserve boundary there are a large number of squatters, whose houses are thickly dotted over the comparatively denuded portions. They are allowed to cultivate paddy in the swampy land of the reserve, and to plant fruit trees on more elevated portions, privileges of which they seem to have extensively availed themselves. The greater portion of the Kesang reserve has been under tapioca cultivation, with the exception of a narrow belt along the outside, which seems to have been left as a screen. There is therefore but little timber of value left in this reserve, and as the denuded portion contains only stray plants of tapioca, it will have to be re-stocked artificially by planting."

In Penang the forests generally occur in isolated patches as in Singapore, whilst in Wellesley good forest remains in the southern districts. The most valuable forest products appear to be the Serayah wood, or Singapore cedar, a species of *Shorea*, Gaharu resin yielded by two distinct species of trees, *viz.*, *Aquillaria malaccensis* and *A. Agallocha*, and Malacca cane.

In the appendices to the report will be found useful lists of indigenous trees, shrubs, creepers and parasites, including a list of those growing spontaneously on waste lands, also lists of exotic trees recommended for introduction, and of trees recommended for road-side planting. Amongst the indigenous trees are several Indian and Burmese species, such as *Pterocarpus indicus*, *Terminalia Catappa*, *Mimusops indica*, *Alstonia scholaris*, *Rhizophora mucronata*, and *Heritiera littoralis*.

It is estimated that Singapore requires annually 810,000 cubic feet of timber, of which more than half is used by Pepper cultivators, and 101,000 tons of firewood, of which half is consumed by Gambier planters and coasting steamers. For the other Settlements no estimate is given, but the consumption is known to be considerable in Penang and Wellesley.

The measures recommended for the better management of the forests are thus summarised—

(*a*). Preventing the felling of forests and the clearing of forest lands.

(*b*). The redemption by exchange, or otherwise, of such land as is selected for planting with forest trees.

(*c*). The survey and demarcation of such Crown forest lands as are still undetermined, and the preparation of good and reliable maps showing the forests and the topographical features of the various lands throughout the Settlements. This is a desideration that should be looked upon as a first duty of the Survey Department.

(*d*). The formation of local forest reserves for the supply of wood for general purposes; and mountain and river reserves for protection where necessary.

(*e*). The establishment of a Forest Department to take charge of all Crown forests whether proclaimed as reserves or otherwise.

(*f*). The marking of certain blocks of forest near the chief towns of each Settlement of a sufficient size to serve as reserves for the supply of fuel and small building wood.

(*g*). The appointment of a body of Forest Police for protective purposes, to be quartered in the country districts throughout the Settlements.

(*h*). The immediate collection of seeds of the best indigenous timber trees, and the formation of nurseries for the propagation of such seeds.

(*i*). The introduction of an ordinance for the better conservation of the Crown lands.

From the first Annual Report of the new Forest Department, we are glad to find that steps have already been taken to give practical effect to a large number of the measures advocated, so that the recommendations (*a*), (*b*), (*d*), (*e*), (*f*) and (*g*) have al-

ready been either entirely or partially carried out, as will be seen from the statement made at the beginning of this review concerning the organisation of the Department, and from the following brief summary by Mr. Cantley of the work taken in hand during the past year :—

"I would point out that the forest reserves dealt with to a more or less extent are 15 in number; that 46 miles of boundary line have been opened, at an average cost of $83 per mile, including the planting up of 12 miles with fast-growing trees; that the area of land laid out in nurseries is over 20 acres; and that some 390,000 plants have been propagated in these nurseries, at an average cost of $1 per 100.

"Seventy acres of waste land were planted with about 148,000 plants, at an average cost of $12 per acre, or per 2,000 plants. The stock in the nurseries at the close of the year numbered about 200,000 plants. It will be noticed that the area of waste land planted with trees is comparatively small, but what was of most importance, *viz.*, the demarcation of reserves, to prevent further encroachment, had to be first undertaken. Over 1,160 lbs. of seeds have been got together from various quarters and utilized for the benefit of the reserves. The buildings erected include quarters for the overseers, stations for the forest watchmen, coolies' houses and plant sheds: in all 27 in number."

To conclude, we wish every success in the future to the Forest Department of the Straits Settlements.

A GOVERNMENT Resolution has been issued appointing the following gentlemen, with the Acting Collector of Tanna as President, as a Commission to enquire into the working of the Forest Act :—Rao Bahadur Daji Govind Gupte, Rao Bahadur Krishnaji Lakshman Nulkar, Mr. E. C. Ozanne, Lieutenant-Colonel William Peyton, and Mr. Robert Charles Wroughton; Rao Bahadur Yeshavant Moreshwar Kelkar, Secretary. The labour of the Commission will be mainly directed :—(*a*), to hearing complaints and ascertaining their reality; (*b*), to the consideration of the best manner in which provision can be made for supplying the wants of the resident agriculturists as distinct from trade demands; (*c*), to the situation of the wild tribes and whether insufficient alternative provision has been made in any case of the transfer of cultivation out of forests, and whether insufficient employment has been found for them to enlist their sympathy; and (*d*), to suggesting means whereby the regulations of the Government may best be made intelligible to the people and hearty co-operation secured in their enforcement.

III. Notes, Queries and Extracts.

Forest Administration in the Thana District.—The following resolution, dated the 20th of July, has been issued by the Bombay Government, on a letter from the Acting Collector of Thana, bringing to the notice of Government some points connected with the forest administration of the district on which it has been found impossible to carry out the orders of Government fully; making some suggestions for the improvement of the system of supplying wood and other forest produce to the residents of the district; and forwarding correspondence between himself and the Divisional Forest Officers, Northern and Southern Thana on the subject:—

These reports explain what was before not quite intelligible to Government, *viz.*, why the settlements of forest questions sanctioned in a series of Resolutions ranging from that on the Thana Forest Conference issued in May 1883, to that on the Callian Taluka Forest Settlement published last May, should have had no effect in adjusting administrative difficulties. It now appears that great delay has occurred in accurately demarcating and making known to the people the forest areas and the precise nature of the privileges accorded by Government. Until this is done and the orders and regulations applicable locally are fully understood, there must be confusion and uncertainty. The delay which has happened is much to be regretted, and all the responsible officers should be stimulated to use the utmost possible despatch in carrying out the instructions of Government and making the people concerned acquainted with those orders.

The series of resolutions above referred to, and the reports of the Thana Forest Conferences show that in that district great difficulties have beset the enforcement of measures of forest conservancy owing to neglect of orders in previous years. Abuses had become so habitual that it was impossible to proceed other than tentatively, by trying various expedients for supplying wants in a legitimate instead of an illicit way. Some of these experiments have succeeded, others have failed. Government has not insisted on hard-and-fast lines, and has been ready to modify and relax their measures on sufficient cause being shown, with the result that there is little to change in or add to the latest orders on a forest settlement (that of the Kalyan Taluka) in order to remove the administrative difficulties explained by Mr. Loch. In a question of so much difficulty and obscurity it is impossible to select at once the best and most ap-

propriate measures: they must be gradually arrived at by experiment and observation. But the objects which the Governor in Council has in view are—1*st*, that the Government regulations in respect of forests, as finally settled should, whilst preserving the public interests, be equitable and liberal in dealing with private interests, and, 2*nd*, that these regulations when finally settled should be firmly enforced.

With regard to Mr. Loch's first proposal, as noted below, the Governor in Council observes that there must be confusion in carrying out regulations whilst everything is shifting. Until forest areas are finally settled and demarcated—a work which should be completed as speedily as possible—the executive officers must make the best arrangements feasible, only taking care, not to resort to extreme measures against trespassers who may transgress orders in ignorance. Government concur with the Commissioner in considering it undesirable to adopt Mr. Loch's suggestion that in the unsettled talukas and the talukas where settlements have been sanctioned but not yet applied "the cultivators should be allowed to cut materials for ráb in the village gurcharans in the old way," which would involve a return to disorder and confusion. Nor is there any real need for the adoption of so retrograde a measure. In their Resolution on the Kalyan settlement Government have authorized the lopping of *ain*, *dhavda* and *bouda* trees in the protected forest areas of the settled talukas. To these there may now be added *nana*. These four varieties of trees are those most used and most useful for ráb purposes, and the permission accorded to lop them in the protected forest lands will, as stated by the Commissioner, reduce to a minimum the ráb difficulty. Where settlements though sanctioned have not yet been introduced, pains should be taken to make the orders generally known, and the people will then have no reason to transgress them as their wants will be amply supplied.

It is necessary now formally to notify under Clause (a) of Section 29 of the Indian Forest Act, the trees to be reserved in protected forests in each taluka of which the settlement has been made. The Forest Settlement Officer, Mr. Atkins, should be requested to submit at once, in consultation with the Collector and the Divisional Forest Officers, a list for each taluka of the varieties of trees proposed to be reserved in the protected forest of that taluka.

The proposed reduction in the prices of timber and other forest produce, including bamboos, is sanctioned as a temporary measure, but the benefit of the reduced rates need not be allowed to wood-dealers or purchasers for export.

The Governor in Council approves of Mr. Loch's proposal that "steps should be taken to close against the traders those forests where the supply of dead wood is only sufficient for the wants of the local community," as also of the suggestion that fellings should be substituted for depôts. It has been made

quite clear in what manner and to what extent Government desire that the wants of the people for agricultural implements and building materials should be supplied, and the local Land Revenue and Forest officers should take the requisite action to carry out the wishes of Government. It is the special duty of the officers in charge of talukas and of the Collector to bring shortcomings in the supply to notice.

The wild tribes are already permitted to obtain from the forests free of charge such wood of the ordinary sorts as they need for the construction and repair of their dwellings, and no further orders on the subject are needed.

Nor does it seem necessary here to issue any additional instructions on the question of grazing and grass-cutting in the Government forests. The orders of Government on this point are explicit and liberal, and the Commissioner does not press for any modification of them. Inhabitants of non-forest villages must pay for grazing, but the fees charged should be very low at first.

Government entirely agree in the views expressed by Mr. Loch in paragraph 14 of his letter, which are in accordance with the orders already issued by them in the Resolutions No. 2638, dated March 27th, 1884, and No. 4120, dated May 21st, 1885.

Bombay Forest Commission.—His Excellency the Governor of Bombay opened the Forest Commission at Poona on Thursday, and in a long speech held that local wants, local customs, and local systems of tenure should not be disturbed unless good cause could be shown for it, and promised that wherever free grazing had been enjoyed a full equivalent would be given. Lord Reay, addressing the members of the Commission, said :—

You have a very delicate and difficult task to perform. You will, I am sure, acquit yourselves of the trust reposed in you with complete independence. The value of your labours will be enhanced if you lay down in your Report the conclusions to which you may have been led by the inquiry, however varied they may be. It is, perhaps, not superfluous for me to add that the members of the Commission who represent the Civil Service are not acting in any way on the Commission as delegates or representatives of Government, but have been appointed to give their own views, the results of their own experience. You will, on the other hand, have to deal not with individual actions or the opinions of individual Government officers, but with the effect of resolutions for which Government is all-responsible. As long as the actions of a Government officer are sanctioned by the open or tacit approval of Government, Government is responsible. I need not here enter elaborately on the various causes which have led to the appointment of this Commission, but it is a remarkable fact that both the late and present Secretary of State have approved of the institution of this inquiry,

and the sanction of His Excellency the Viceroy has also been obtained. The importance of the subject has been recognised, therefore, on all sides. Since I have had the honour of being charged with my present duties the matter has been a constant source of anxiety to me. Agricultural problems have always struck me as peculiarly interesting, and the more one looks into the various agricultural systems of various countries the more one becomes convinced that over-legislation in agricultural matters is a mistake, and that in the present condition of agricultural science, which is not by any means as far advanced as it ought to be, we must be careful to interfere as little as possible. Agricultural centralisation would certainly lead to disastrous consequences. To introduce into Lancashire the agricultural system of the lowlands of Scotland or the Ulster custom would betray rashness. Local wants, local customs, and local systems of village tenure have a right not to be wantonly disturbed unless a very good cause be shown for it. In many instances a scientific justification for local agricultural practices unconscientiously observed by the population will be forthcoming, I approach agricultural questions with a strong bias in favour of the agriculturist, as every Scotsman would who has been accustomed in Scotland to give the most respectful consideration to the experience of shrewd farmers and shepherds and farm servants. In his speech on the Indian Budget the Secretary of State asked the question, how are you on the one hand to obtain the most desirable objects of preserving and renewing the forests without, on the other hand, entailing hardships on the people by depriving them of valuable and long-established rights? That is the question which has constantly presented itself to me. I believe, however, that if forest conservancy tends to increase the supply of fodder and fuel for the people of this country, the enterprise will meet with their support and has a right to their sympathy. I also believe that the hardships can be mitigated, and that we have recently done a great deal to reduce them to a minimum. My chief object is to substitute co-operation for antagonism, confidence for distrust, contentment for disturbance. The worst result of centralisation is that measures which must inevitably benefit the people ultimately take a longer time for their acceptance than if they had been settled locally. In every forest settlement which I have dealt with I have always carefully considered the peculiar circumstances of the locality, the existing resources for feeding of cattle and for the extension of cultivation, and the advantages which would accrue to the inhabitants from forest conservancy. And here, gentlemen, let me say that I believe that if your district boards had to deal with these questions they would not in their decisions come to conclusions differing very materially from those to which we have come. We are at great disadvantage because we have very often to decide at a distance intricate questions, and I for one have very keenly felt the respon-

sibility of deciding between conflicting opinions of local officers who performed their difficult duties with great care. One thing, however, is quite clear. If you wish to have improved fodder and more fuel you must allow your plantations to grow; you must protect the young growth by closing such areas; you must close those areas in such a way that you cause a minimum of inconvenience to those who used to find on such areas pasture for their cattle. On the grazing question your report will no doubt throw light, but meanwhile you may take for granted that it is the determination of Government that wherever free grazing has been lawfully enjoyed it will be continued by giving a full equivalent in all those cases where the area hitherto used has been absorbed. I do not think that the people will have anything to complain of, as the equivalent will be an improvement on what formerly provided them with an insufficient supply. How, when, and where areas are to be closed; how, when, and in what numbers cattle are to be admitted to open areas, and on what conditions, seem to me to be essentially questions which must be settled on the spot by the combined action of the Revenue officers and the Forest officers, and on which Government can only lay down general principles. I may give an illustration from my own personal experience. By the last mail I instructed my agent, who had asked me whether I wanted pasture or timber, to settle the matter on the spot. Your Commission will fulfil the mandate contained in the Government resolution of July 24th unhampered by any extraneous influence. A speedy, full, and local investigation of the forest conservancy of the district of Tanna will, however, be most welcome to the Government, as it wishes to obtain your advice in detail on the situation of that district which affords scope for the examination of nearly all the questions with which Government have to deal. You will, I doubt not, assist the Government in its endeavours to remove legitimate grievances. You will also assist Government in preventing wanton destruction of timber, a proceeding utterly unwarrantable and most demoralising and injurious to the local national interests. A strong Government does not stand in need of exceptional measures to put a stop to such vandalism. This Commission will strengthen, not weaken, the ultimate actions of Government. It will uphold law and order, promote one of the chief elements of agriculture, namely, good pasture; promote harmony between the Administration on the one side and the people on the other, whose interests will be ably represented on this Commission, not only by those whom they will perhaps more especially consider as their representatives, but also by officials whose desire, I know from personal experience, it is to preserve to the people privileges to which naturally they attach great value. You enjoy the confidence of Government, but your labours, gentlemen, will, I am sure, give you a further title to the gratitude of the people of the Presidency.

IV. Extracts from Official Gazettes.

1.—Gazette of India—

No. 913.—*The 18th September, 1885.—Captain E. S. Wood,* Conservator of Forests in Oudh, reverted to his substantive appointment in the 2nd grade of Conservators on the 28th April, 1885.

2.—Calcutta Gazette—

The 28th August, 1885.—According to the sanction given by the Secretary of State for India to the increase of the forest staff on the Bengal-Assam list, with effect from the 7th February, 1885, His Honor the Lieutenant-Governor, with the concurrence of the Chief Commissioner of Assam, is pleased to make the following promotions from that date:—

Mr. W. M. Green, Deputy Conservator of Forests, 4th grade, *sub pro tem.*, is confirmed in that grade.

Mr. C. A. G. Lillingston, Assistant Conservator of Forests, 1st grade, *sub pro tem.*, is confirmed in that grade.

Mr. R L. Heinig, Assistant Conservator of Forests, 3rd grade, is promoted to the 2nd grade of Assistant Conservators with effect from the 20th April, 1885.

The 4th September, 1885.— Mr. E. E. Wylly, Sub-Assistant Conservator of Forests, 2nd grade, in charge of the Khoorda sub-division of the Orissa Forest Division, is promoted to the 1st grade of Sub-Assistant Conservators with effect from the 16th July, 1885.

3.—North-Western Provinces and Oudh Gazette—

No. 913.—*The 18th September, 1885.—Captain E. S. Wood,* Conservator of Forests in Oudh, reverted to his substantive appointment, in the 2nd grade of Conservators, on the 28th April, 1885.

4.—Punjab Gazette—

No. 1186.—*The 3rd September, 1885.—Mr. A. M. Reuther,* Deputy Conservator of Forests, Lahore Division, is granted three months' privilege leave with effect from the afternoon of the 27th July, 1885.

Mr. A. L. McIntire, Assistant Conservator of Forests, is placed in charge of the Lahore Division during Mr. Reuther's absence on leave.

No. 1362.—*The 17th September, 1885.*—*Mr. J. L. Pigot*, Assistant Conservator of Forests, obtained three months' examination leave with effect from the 23rd of July, 1885.

5.—CENTRAL PROVINCES GAZETTE—

No. 3303.—*The 27th August, 1885.*—*Mr. Mahomed Anwarkhan*, Sub-Assistant Conservator of Forests, attached to the Nimar Forest Division, availed himself on the afternoon of the 12th current of the three months' privilege leave granted to him by Notification No. 2666 of 13th ultimo.

No. 3305.—*Mr. Mahomed Ghouse*, Sub-Assistant Conservator of Forests, is temporarily transferred from the Balaghat district to the Mandla Division.

Mr. Mahomed Ghouse relinquished charge of his duties in the Balaghat district on the forenoon of the 31st ultimo.

No. 3306.—*Captain C. W. Losack*, Deputy Conservator of Forests, 1st grade, availed himself on the afternoon of the 8th current of the privilege leave granted to him by Notification No. 2664 of 13th ultimo, making over charge of the Mandla Forest Division to *Mr. Mahomed Ghouse*, Sub-Assistant Conservator of Forests.

6.—BRITISH BURMAH GAZETTE—

No. 6.—*The 21st August, 1885.*—*Captain C. T. Bingham*, Deputy Conservator of Forests, made over, and *Mr. T. H. Aplin*, Deputy Conservator of Forests, received, charge of the Western Division on the forenoon of the 1st August, 1885.

No. 57.—*The 29th August, 1885.*—The following promotion is ordered in the Forest Department, with effect from the 7th August, 1885 :—

Mr. J. C. Murray, Assistant Conservator, 2nd grade, to be Assistant Conservator, 1st grade.

No. 58.—*The 2nd September, 1885.*—Under the provisions of Section 138 of the Civil Leave Code, privilege leave for one month is granted to *Mr. C. Ingram*, probationary Sub-Assistant Conservator of Forests, with effect from the date on which he may avail himself of it.

No. 1.—*The 4th September, 1885.*—*Mr. C. W. Palmer*, Deputy Conservator of Forests, 3rd grade, reported his return to duty, on the afternoon of the 5th August, 1885. from the privilege leave granted him in Notification No. 37F., dated the 18th June, 1885.

No. 7.—*The 9th September, 1885.*—*Captain C. T. Bingham*, Deputy Conservator of Forests, and *Mr. T. H. Aplin*, Deputy Conservator of Forests, respectively made over and received charge of the Western Division on the forenoon of the 7th instant,

7.—ASSAM GAZETTE—

[*Bail to be taken in forest cases.—R. D. Cir. No. 6, dated the 25th January, 1884*].—With a view to prevent the possibility of Section 63 of the Indian Forest Act of 1878, clauses 1 and 2 (reproduced on the margin) being worked in an unnecessarily oppressive manner, the Chief Commissioner is pleased to direct that in cases of arrest made under the section quoted, where the Magistrate's court is at a distance from the scene of the alleged offence, and a police station is within convenient access, an accused person who is ready and willing to give bail should be taken for the purpose to the police station, the officer in charge of which will thereupon take action in the matter in accordance with the provisions of the Criminal Procedure Code, Chapter XXXIX.

"Any Forest Officer or Police Officer may, without orders from a Magistrate and without a warrant, arrest any person against whom a reasonable suspicion exists of his having been concerned in any forest offence punishable with imprisonment for one month or upwards.

"Every Officer making an arrest under this section shall, without unnecessary delay, take or send the person arrested before the Magistrate having jurisdiction in the case."

[*Duty on Foreign Timber in Cachar.—Notification No. 21, dated the 31st July, 1885*].—Owing to a clerical error in Notification No. 19, dated the 8th July, 1885 (Revenue Department), the following revised notification is published in supersession of the same :—

In exercise of the power conferred by Section 39 of Act VII. of 1878 (the Indian Forest Act 1878) and in supersession of Revenue Department Notification No. 11, dated 11th May, 1880, the Chief Commissioner of Assam is pleased, with the previous sanction of the Governor-General in Council, to direct that, on and from the 1st day of August, 1885, duty shall be levied on all timber which is brought down from any place beyond the frontier of British India by the Barak and Katakhal rivers, or any of their tributaries, in the district of Cachar, at the following rates :—

	Rs.	A.	P.
1. For every cubic foot of timber in the rough of the following kinds :—			
Jarul, Nagessar, Cham, Gandrai,.....	0	4	0
Kurta, Rata, Poma, Jhoki, Tailo, Shundi, Karal, Jam, and Ping.....	0	3	0
All other kinds, per cubic foot,.....	0	1	0
2. For every cubic foot of converted timber the above rates with an addition of 25 per cent.			
3. For every thousand bamboos,.....	2	8	0

8.—MYSORE GAZETTE—

Nil.

9.—MADRAS GAZETTE—

No. 248.—*The 10th September, 1885.—Mr. J. H. B. Brougham,* Assistant Conservator of Forests, 1st grade, privilege leave for three months, with effect from the 13th June, 1885, under Section 138 of the Civil Leave Code, 6th edition.

No. 249.—*The 15th September, 1885.—Mr. C. G. Douglas*, Examiner of Forest Accounts, Madras, furlough on medical certificate for one year under Section 50 of the Civil Leave Code, 6th edition, with the usual subsidiary leave, from or after the 20th instant.

No. 257.—*The 18th September, 1885.—Mr. J. P. Peake*, Assistant Conservator of Forests, 3rd grade, to be Assistant Conservator of Forests, 2nd grade, with effect from 20th July, 1885, and to be District Forest Officer, South Canara.

No. 258.—*The 19th September, 1885.*—The following appointments will have effect during the absence of *Mr. C. G. Douglas*, Deputy Conservator of Forests, 2nd grade, and Examiner of Forest Accounts, on leave, or until further orders:—

No. 259.—*Mr. F. d'A. Vincent*, Deputy Conservator, 3rd grade, to officiate as Deputy Conservator, 2nd grade.

No. 260.—*Mr. E. H. Boileau*, Deputy Conservator, 4th grade, to officiate as Deputy Conservator, 3rd grade.

No. 261.—*Mr. J. H. B. Brougham*, Assistant Conservator, 1st grade, to officiate as Deputy Conservator, 4th grade.

No. 262.—*Mr. G. Homfray*, Assistant Conservator, 3rd grade, to officiate as Assistant Conservator, 1st grade, and to be in charge of the office of the Examiner of Forest Accounts.

No. 263.—*Mr. H. T. D. Sweet*, Assistant Conservator of Forests, to be Officiating District Forest Officer, Vizagapatam.

No. 264.—*The 16th September, 1885.—Mr. J. H. B. Brougham*, Assistant Conservator of Forests, to be District Forest Officer, Bellary.

No. 265.—*Mr. J. S. Battie*, Assistant Conservator of Forests, District Forest Officer, Bellary, to be District Forest Officer, Godavri.

10.—BOMBAY GAZETTE—

The 27th August, 1885.—Messrs. G. M. Ryan, Acting Assistant Conservator of Forests, and *G. F. R. Blackwell*, Acting Sub-Assistant Conservator of Forests, respectively delivered over and received charge of the Divisional Forest Office, North Thána, on the 24th August, 1885, after noon.

No. 7384.—*The 11th September, 1885.—Mr. Gopál Svámiráo*, Forester, 3rd grade, acted as Sub-Assistant Conservator of Forests and Divisional Forest Officer, Bijápur, from 26th December, 1884 to 10th March, 1885.

No. 7483.—*The 15th September, 1885.—Mr. R. H. Madan* substantive *pro tem.* Sub-Assistant Conservator of Forests, 3rd grade, was allowed privilege leave of absence from 29th July to 18th August, 1885, both days inclusive.

The 19th September, 1885.—Mr. G. F. R. Blackwell, Acting Sub-Assistant Conservator of Forests, 3rd grade, delivered over and *Mr. A. D. Wilkins*, Assistant Conservator of Forests, 1st grade, received charge of the office of the Divisional Forest Officer, North Thána, on the 15th September, 1885, after office hours.